

10/744,394

=> FILE REG

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

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=> D HIS

FILE 'HCAPLUS' ENTERED ON 27 DEC 2007

L1 569 S SOHMA ?/AU  
L2 7430 S IGUCHI ?/AU  
L3 1151 S KANAOKA ?/AU  
L4 4 S SAITAMA ?/AU  
L5 10279 S MORIKAWA ?/AU  
L6 336 S MITSUTA ?/AU  
L7 0 S L1 AND L2 AND L3 AND L4 AND L5 AND L6  
L8 5282 S KAJI ?/AU  
L9 1 S L1 AND L2 AND L3 AND L8 AND L5 AND L6  
SEL RN

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

L10 8 S E1-E8

FILE 'LREGISTRY' ENTERED ON 27 DEC 2007

L11 STR

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

L12 SCR 2043  
L13 31 S L11 AND L12  
L14 3 S L10 AND PMS/CI  
L15 720 S L11 AND L12 FUL  
SAV L15 WEI394/A

FILE 'HCA' ENTERED ON 27 DEC 2007

L16 72146 S FUEL?(2A) (CELL OR CELLS)  
L17 329 S L15  
L18 94 S L16 AND L17  
L19 QUE CAT# OR CATALY?  
L20 QUE ELECTROD## OR CATHOD## OR ANOD##  
L21 11 S L18 AND L19  
L22 16 S L18 AND L20  
L23 6 S L21 AND L22

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

L24 1159 S 1478-61-1/CRN

L25 277 S 90-98-2/CRN  
 L26 75 S L24 AND L25  
 L27 55 S L26 AND S/ELS  
 L28 48 S L26 AND (?SULFONIC? OR ?SULFONAT?)/CNS

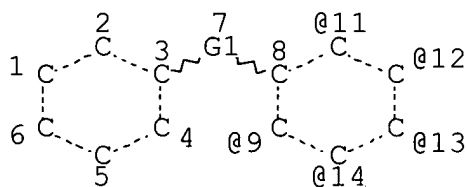
FILE 'HCA' ENTERED ON 27 DEC 2007

L29 89 S L28  
 L30 72 S (L26/D OR L26/DP) (L) (?SULFONIC? OR ?SULFONAT?)  
 L31 65 S L29 AND L16  
 L32 40 S L30 AND L16  
 L33 25 S (L31 OR L32) AND L19  
 L34 39 S (L31 OR L32) AND L20  
 L35 24 S L33 AND L34  
 L36 4 S 1840-2002/PY,PRY,AY AND L35  
 L37 76 S (L31 OR L32) NOT L36  
 L38 6 S 1840-2002/PY,PRY,AY AND L37  
 L39 15 S (L21 OR L22) NOT L23  
 L40 73 S L18 NOT (L23 OR L39)  
 L41 0 S 1840-2002/PY,PRY,AY AND L23  
 L42 1 S 1840-2002/PY,PRY,AY AND L39  
 L43 8 S 1840-2002/PY,PRY,AY AND L40

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

=> D L15 QUE STAT

L11 STR

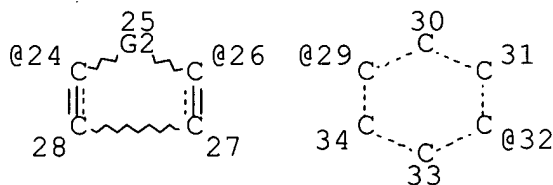


SO3H @17

CH=CH  
 @18 @19

C≡C  
 @22 @23

S @37



VAR G1=O/37/18-3 19-8/22-3 23-8/24-3 26-8/29-3 32-8

VAR G2=O/S

VPA 17-11/12/13/14/9 U

NODE ATTRIBUTES:

CONNECT IS E2 RC AT 37

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RSPEC I

NUMBER OF NODES IS 30

STEREO ATTRIBUTES: NONE

L12 SCR 2043

L15 720 SEA FILE=REGISTRY SSS FUL L11 AND L12

100.0% PROCESSED 2707 ITERATIONS

720 ANSWERS

SEARCH TIME: 00.00.01

=> FILE HCA

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(FORMULA 1)

=> D L42 1 BIB ABS HITSTR HITIND

L42 ANSWER 1 OF 1 HCA COPYRIGHT 2007 ACS on STN

AN 138:339060 HCA Full-text

TI Crosslinkable aromatic resins having protonic acid groups, and ion  
conductive polymer membranes, binders, and **fuel**  
**cells** made by using the same

IN Ishikawa, Junichi; Kuroki, Takashi; Fujiyama, Satoko; Omi, Takehiko;  
Nakata, Tomoyuki; Okawa, Yuichi; Miyazaki, Kazuhisa; Fujii,  
Shigeharu; Tamai, Shoji

PA Mitsui Chemicals, Inc., Japan

SO PCT Int. Appl., 132 pp.

CODEN: PIXXD2

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	WO 2003033566	A1	20030424	WO 2002-JP10536	

200210  
10

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W: CA, CN, IN, JP, KR, US  
RW: DE, FR, GB, IT, SE  
TW 236486 B 20050721 TW 2002-91123279

200210  
09

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CA 2463429 A1 20030424 CA 2002-2463429

200210  
10

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EP 1457511 A1 20040915 EP 2002-775319

200210  
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R: DE, FR, GB, IT, SE, SI, LT, LV, RO, MK, AL  
CN 1630676 A 20050622 CN 2002-820224

200210  
10

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US 2004191602 A1 20040930 US 2004-820842

200404  
09

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PRAI JP 2001-312799 A 20011010 <--  
JP 2002-182252 A 20020621 <--  
WO 2002-JP10536 W 20021010 <--

AB The invention relates to (A) a crosslinkable arom. resin which has crosslinking groups and protonic acid groups and is suitable for electrolyte membranes and binders for **fuel cells**, (B) polymeric electrolyte membranes and binders for **fuel cells**, made by using the resin, and (C) **fuel cells** made by using the membranes or the binders. The arom. resin has crosslinking groups which are not derived from protonic acid groups and are capable of causing crosslinking without the formation of a leaving component, and exhibits excellent ionic cond., heat resistance, water resistance, and adhesion, and low methanol permeability. It is preferable that the arom. resin bears as the crosslinking groups both C1-10 alkyl bonded directly to an arom. ring and carbonyl or carbon-carbon double or triple bonds, while preferred examples of the crosslinkable arom. resin include arom. polyether, arom. polyamide, arom. polyimide, arom. polyamide-imide, and arom. polyazole, each of which has crosslinking groups described above. Thus, 5,5'-carbonylbis(sodium 2-fluorobenzenesulfonate) obtained from 0.525 mol 4,4'-difluorobenzophenone and 210 mL 50% sulfuric acid 4.22, 4,4'-

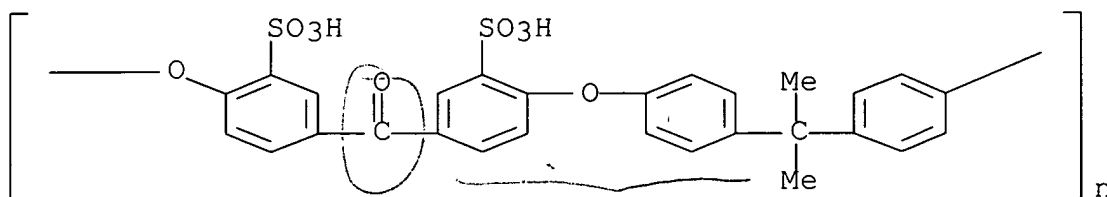
difluorobenzophenone 2.18, and 2,2-bis(3,5-dimethyl-4-hydroxyphenyl)propane 5.69 g were reacted at 160° for 4 h in the presence of potassium carbonate to give 10.39 g polyether ketone powder with reduced viscosity 0.85 dL/g, glass transition temp. 230°, and 5% wt. loss temp. 367°, which was applied on a glass and dried at 200° for 4 h to give a membrane with cond. 0.018 S/cm at 30° and 0.065 S/cm at 90°.

IT 342047-79-4DP, reaction products with ethenylphenol  
515144-59-9P

(crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

RN 342047-79-4 HCA

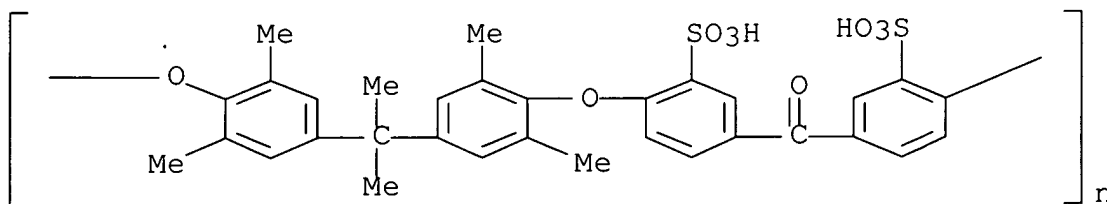
CN Poly[oxy(2-sulfo-1,4-phenylene)carbonyl(3-sulfo-1,4-phenylene)oxy-1,4-phenylene(1-methylethylidene)-1,4-phenylene sodium salt (1:2)]  
(CA INDEX NAME)



● 2 Na

RN 515144-59-9 HCA

CN Poly[oxy(2,6-dimethyl-1,4-phenylene)(1-methylethylidene)(3,5-dimethyl-1,4-phenylene)oxy(2-sulfo-1,4-phenylene)carbonyl(3-sulfo-1,4-phenylene) disodium salt] (9CI) (CA INDEX NAME)



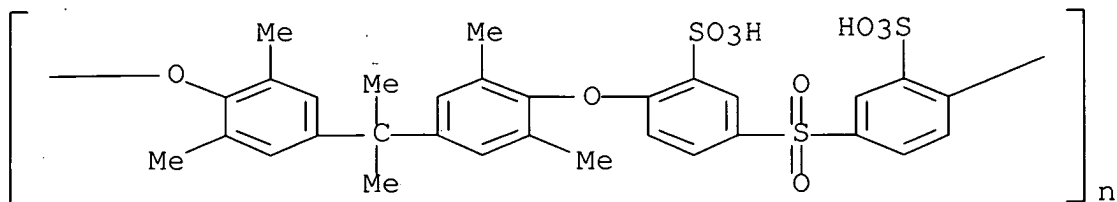
● 2 Na

IT 515811-98-0P

(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

RN 515811-98-0 HCA

CN Poly[oxy(2,6-dimethyl-1,4-phenylene)(1-methylethylidene)(3,5-dimethyl-1,4-phenylene)oxy(2-sulfo-1,4-phenylene)sulfonyl(3-sulfo-1,4-phenylene) disodium salt] (9CI) (CA INDEX NAME)



● 2 Na

IC ICM C08G065-40

ICS C08G069-48; C08G073-10; C08J005-22; H01M008-02

CC 37-3 (Plastics Manufacture and Processing)

Section cross-reference(s): 38, 52

IT Polyamides, uses

Polyimides, uses

(arom., protonic acid-contg.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyimides, preparation

(blend with protonic acid group-contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Binders

(ion conductive; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Membranes, nonbiological

(ionic conductive; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyimides, uses

(polyamide-, arom., protonic acid-contg.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive

- polymer membranes, binders, and **fuel cells**)
- IT Polyimides, preparation  
(polyamide-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyketones  
(polyamide-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyketones  
(polyamide-polyimide-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyimides, preparation  
(polyamide-polyketone-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyethers, preparation  
(polybenzoxazole-, blend with protonic acid group-contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyketones  
(polybenzoxazole-, sodium sulfonated, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polybenzoxazoles  
(polyether-, blend with protonic acid group-contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polysulfones, preparation  
Polysulfones, preparation  
(polyether-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyketones  
(polyether-, optionally crosslinked, and blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polysulfides  
(polyether-, polyketones-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polysulfones, preparation

- (polyether-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polysulfones, preparation  
(polyether-polyketone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyketones  
(polyether-polysulfone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyamides; uses  
(polyimide-, arom., protonic acid-contg.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyamides, preparation  
Polyketones  
Polysulfones, preparation  
(polyimide-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polysulfones, preparation  
(polyimide-polyketone-, blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyamides, preparation  
(polyimide-polyketone-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyketones  
(polyimide-polysulfone-, blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyimides, preparation  
(polyketone-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyethers, preparation  
(polyketone-, optionally crosslinked, and blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polybenzoxazoles  
(polyketone-, sodium sulfonated, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion



conductive polymer membranes, binders, and **fuel cells**)

- IT Polyamides, preparation  
(polyketone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyimides, preparation  
(polyketone-polysulfone-, blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyethers, preparation  
(polyketone-polysulfone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyethers, preparation  
(polysulfide-, polyketones-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyethers, preparation  
Polyethers, preparation  
Polyimides, preparation  
(polysulfone-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polyethers, preparation  
(polysulfone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT **Fuel cells**  
Ionic conductors  
Polymer electrolytes  
(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polymer blends  
(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT **Electrodes**  
(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, **electrodes**, and **fuel cells**)
- IT Polyoxyarylenes  
(protonic acid-contg.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

- IT Polyoxyphenylenes  
(sodium sulfonated; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT Polybenzoxazoles  
(sulfonated; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 25134-01-4DP, Poly(2,6-dimethyl-1,4-phenylene oxide), sodium sulfonated  
(assumed monomers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 31694-16-3DP, PEEK 450P, sodium sulfonated  
(blend with polyether-polyketone or polybenzoxazole, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 515144-49-7P 515144-50-0P 515144-51-1P 515144-53-3P  
(blend with polyimide; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 29658-28-4P 32034-67-6P  
(blend with protonic acid group contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 87781-17-7P 87792-34-5P  
(blend with protonic acid group contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 25897-65-8P, Bisphenol A-4,4'-difluorobenzophenone copolymer  
28825-50-5P, 3,3',4,4'-Benzophenonetetracarboxylic dianhydride-3,3'-Diaminodiphenylsulfone copolymer 41205-96-3P  
54571-77-6P 127583-87-3P 127669-56-1P 515144-54-4P  
515144-55-5P  
(blend with protonic acid group-contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 515144-56-6P 515144-57-7P  
(blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 108-31-6DP, Maleic anhydride, reaction products with protonic acid

group-contg. polymers 405-99-2DP, 4-Fluorostyrene, reaction products with sulfonated polymers 620-18-8DP, 3-Vinylphenol, reaction products with sulfonated polymers 1076-99-9DP, 4-Allylbenzoic acid, reaction products with protonic acid group-contg. polymers 1120-71-4DP, Propanesultone, reaction products with arom. polyether-polyketones 1745-89-7DP, reaction products with sulfonated polymers 20161-52-8DP, reaction products with sulfonated polymers 102501-86-0DP, 2-Allylphenol-2,6-dimethylphenol copolymer, sodium sulfonated 146673-88-3DP, reaction products with ethylenically unsatd. compds. 163395-54-8DP, reaction products with protonic acid group-contg. polymers 210531-46-7DP, reaction products with ethenylphenol 342047-78-3DP, reaction products with ethenylphenol **342047-79-4DP**, reaction products with ethenylphenol 515144-35-1P 515144-36-2P 515144-37-3P 515144-38-4P 515144-39-5P 515144-40-8P 515144-41-9P 515144-42-0P 515144-44-2DP, sulfonated 515144-45-3DP, sulfonated 515144-47-5P 515144-48-6P 515144-51-1DP, reaction products with ethenylbenzoyl chloride 515144-53-3DP, reaction products with ethenylbenzoyl chloride 515144-58-8P **515144-59-9P** 515144-66-8DP, reaction products with ethenylphenol 515144-67-9DP, reaction products with ethenylphenol 515144-68-0DP, reaction products with ethenylphenol 515144-69-1DP, reaction products with ethenylphenol 515144-70-4DP, reaction products with ethylenically unsatd. compds. 515144-71-5DP, reaction products with monoanhydride compds. 515144-72-6DP, reaction products with maleic anhydride 515144-73-7DP, reaction products with allylbenzoic acid, sulfonated 515144-74-8DP, reaction products with allylbenzoic acid, sulfonated 515144-75-9DP, reaction products with ethylenically unsatd. compds.

(crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

- IT 51698-33-0P 210531-45-6P 515144-46-4P  
(monomer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 515144-24-8P 515144-34-0P  
(optionally crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 515144-43-1DP, sulfonated  
(polybenzoxazole, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)
- IT 24938-67-8DP, Poly(2,6-dimethyl-1,4-phenylene oxide), sodium sulfonated 267877-35-0DP, reaction products with ethenylphenol 515144-25-9P 515144-26-0P 515144-27-1P 515144-28-2P

515144-29-3P 515144-30-6P 515144-31-7P 515144-32-8P  
515144-33-9P 515144-60-2P 515144-61-3P 515144-62-4P  
515144-64-6DP, sulfonated 515144-65-7DP, sulfonated

**515811-98-0P**

(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 80-05-7, 2,2-Bis(4-hydroxyphenyl)propane, reactions 80-07-9, 4,4'-Dichlorodiphenylsulfone 345-92-6, 4,4'-Difluorobenzophenone (reactant in monomer prepn.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> D L43 1-8 BIB ABS HITSTR HITIND

L43 ANSWER 1 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 140:324161 HCA Full-text

TI Sulfonic acid group-containing polyimide compositions and their membranes with high proton conductivity for **fuel cells**

IN Kuromatsu, Hidehisa; Minamimura, Kiyoyuki

PA Kanegafuchi Chemical Industry Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 26 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	JP 2004107484	A	20040408	JP 2002-271858	20020918

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PRAI JP 2002-271858 20020918 <--

AB The compns., useful for solid polymer electrolyte **fuel cells**, direct methanol **fuel cells**, comprise polyimides contg. (A) repeating units prepd. from (a) components having  $\geq 3$  amino groups and tetracarboxylic dianhydride or (b) components having  $\geq 3$  acid anhydride groups and diamines and (B) repeating units prepd. from diamines having sulfonic acid-contg. groups on arom. rings and tetracarboxylic dianhydrides. The polyimide membranes show good water and oxidn. resistance and low methanol permeability.

IT **677342-69-7P 677342-73-3P**

(sulfonic acid group-contg. polyimide compns. for **fuel cell** membranes with high proton cond.)

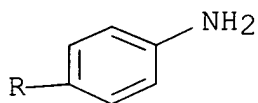
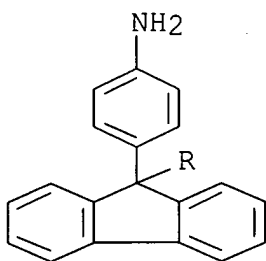
RN 677342-69-7 HCA

CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone, [1,1'-biphenyl]-3,3',4,4'-tetramine and 4,4'-(9H-fluoren-9-ylidene)bis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 15499-84-0

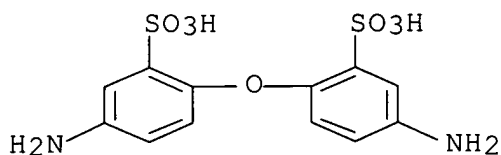
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CM 2

CRN 6375-06-0

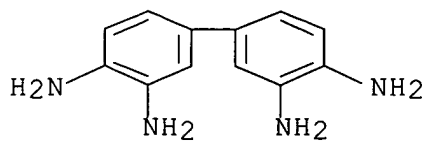
CMF C12 H12 N2 O7 S2



CM 3

CRN 91-95-2

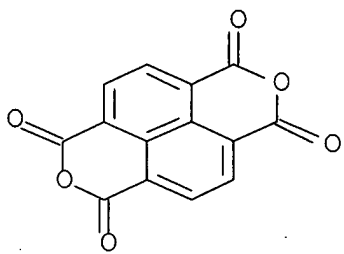
CMF C12 H14 N4



CM 4

CRN 81-30-1

CMF C14 H4 O6



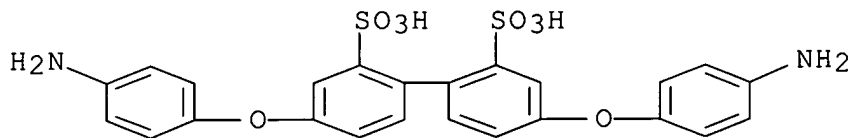
RN 677342-73-3 HCA

CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-bis(4-aminophenoxy)-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone, [1,1'-biphenyl]-3,3',4,4'-tetramine and 4,4'-(9H-fluoren-9-ylidene)bis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 677342-72-2

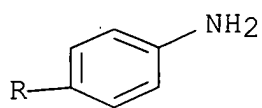
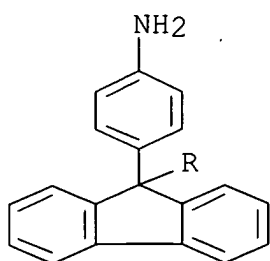
CMF C24 H20 N2 O8 S2



CM 2

CRN 15499-84-0

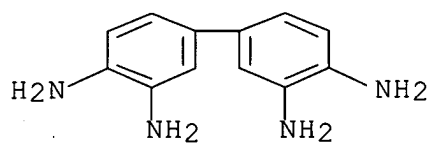
CMF C25 H20 N2



CM 3

CRN 91-95-2

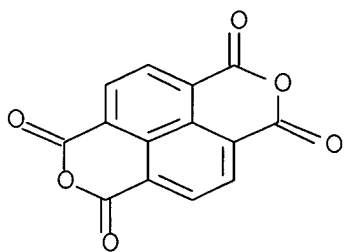
CMF C12 H14 N4



CM 4

CRN 81-30-1

CMF C14 H4 O6



- IC ICM C08G073-10
- ICS C08J005-22; H01B001-06; H01M008-02; H01M008-10; C08L079-08
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 76
- ST sulfonic polyimide **fuel cell** polymer electrolyte  
membrane; direct methanol **fuel cell** ion  
conductor polyimide; aminosulfophenyl aminophenylfluorene  
aminobenzidine naphthalenetetracarboxylic dianhydride polyimide  
membrane
- IT Polyimides, uses  
(cardo; sulfonic acid group-contg. polyimide compns. for  
**fuel cell** membranes with high proton cond.)
- IT **Fuel cells**  
(direct methanol-type; sulfonic acid group-contg. polyimide  
compns. for **fuel cell** membranes with high  
proton cond.)
- IT Polyimides, uses  
(polyether-, cardo; sulfonic acid group-contg. polyimide compns.  
for **fuel cell** membranes with high proton  
cond.)
- IT Cardo polymers  
(polyether-polyimides; sulfonic acid group-contg. polyimide  
compns. for **fuel cell** membranes with high  
proton cond.)
- IT Polyethers, uses  
(polyimide-, cardo; sulfonic acid group-contg. polyimide compns.  
for **fuel cell** membranes with high proton  
cond.)
- IT Cardo polymers  
(polyimides; sulfonic acid group-contg. polyimide compns. for  
**fuel cell** membranes with high proton cond.)
- IT Ionic conductors  
(polymeric; sulfonic acid group-contg. polyimide compns. for  
**fuel cell** membranes with high proton cond.)
- IT Membranes, nonbiological



(proton-conducting; sulfonic acid group-contg. polyimide compns. for **fuel cell** membranes with high proton cond.)

IT **Fuel cells**

(solid electrolyte, polymer electrolyte **fuel cells**; sulfonic acid group-contg. polyimide compns. for **fuel cell** membranes with high proton cond.)

IT **Fuel cell electrolytes**

Polymer electrolytes

(sulfonic acid group-contg. polyimide compns. for **fuel cell** membranes with high proton cond.)

IT **677342-69-7P 677342-73-3P 677342-76-6P**

**677342-80-2P**

(sulfonic acid group-contg. polyimide compns. for **fuel cell** membranes with high proton cond.)

L43 ANSWER 2 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 140:5888 HCA Full-text

TI Polyimide porous film composites and creep-resistant proton-conducting films therefrom for **fuel cells**

IN Oya, Nobuo; Yao, Shigeru; Kiuchi, Masayuki; Hirano, Tetsuji

PA Ube Industries, Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 8 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI JP 2003335895	A	20031128	JP 2002-147701	
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200205  
22

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PRAI JP 2002-147701 20020522 <--

AB The composites comprise (A) polyimide porous films and (B) (proton-conducting) (in)org. materials with high heat resistance filled in the pores and held by phys./chem. interaction. Thus, a polyimide porous film of 3,3',4,4'-biphenyltetracarboxylic dianhydride-4,4'-diaminodiphenyl ether copolymer was impregnated with 4,4'-bis(4-aminophenoxy)biphenyl-3,3'-disulfonic acid triethylamine salt-1,4,5,8-naphthalenetetracarboxylic acid copolymer and immersed in 1N HCl to give a proton-conducting film showing ion cond.  $2.1 \times 10^{-2}$  S/cm at 60° and 90% relative humidity.

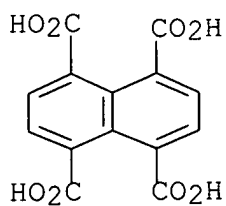
IT **627904-72-7P 627904-73-8P**

(in-pore proton conductors; proton-conducting polyimide porous film composites for **fuel cells**)

RN 627904-72-7 HCA  
CN 1,4,5,8-Naphthalenetetracarboxylic acid, polymer with  
4,4'-bis(4-aminophenoxy)[1,1'-biphenyl]-3,3'-disulfonic acid compd.  
with N,N-diethylethanamine (1:2) (9CI) (CA INDEX NAME)

CM 1

CRN 128-97-2  
CMF C14 H8 O8

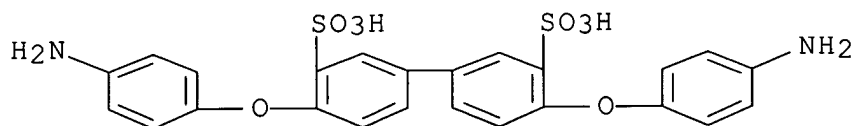


CM 2

CRN 627904-71-6  
CMF C24 H20 N2 O8 S2 , 2 C6 H15 N

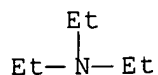
CM 3

CRN 500295-67-0  
CMF C24 H20 N2 O8 S2



CM 4

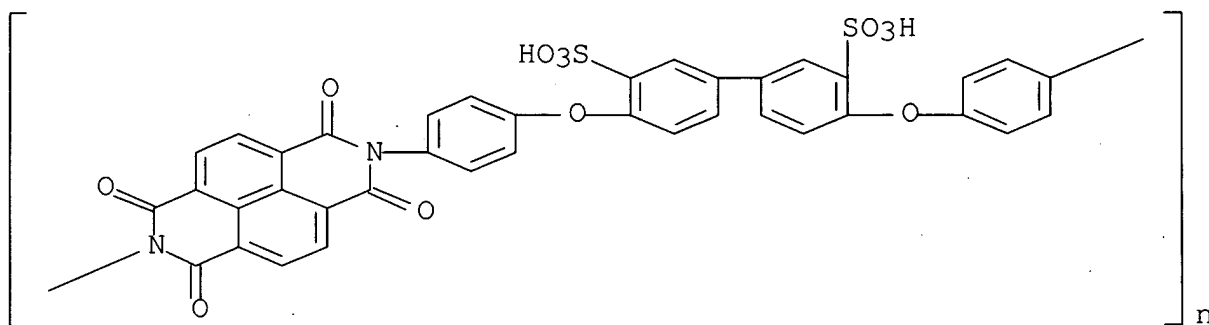
CRN 121-44-8  
CMF C6 H15 N



RN 627904-73-8 HCA  
 CN Poly[(1,3,6,8-tetrahydro-1,3,6,8-tetraoxobenzo[lmn][3,8]phenanthroline-2,7-diyl)-1,4-phenyleneoxy(3,3'-disulfo[1,1'-biphenyl]-4,4'-diyl)oxy-1,4-phenylene compd. with N,N-diethylethanamine (1:2)]  
 (9CI) (CA INDEX NAME)

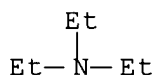
CM 1

CRN 500295-69-2  
 CMF (C38 H20 N2 O12 S2)n  
 CCI PMS



CM 2

CRN 121-44-8  
 CMF C6 H15 N



IC ICM C08J009-36  
 ICS H01B001-06; H01M008-02; H01M008-10; C08L079-08  
 CC 38-3 (Plastics Fabrication and Uses)  
 Section cross-reference(s): 52  
 ST **fuel cell** proton conductor porous polyimide film  
 filler composite; sulfonated polyimide polyether filled proton  
 conducting porous membrane; biphenylcarboxylic anhydride aminophenyl

ether copolymer porous film ion conductor;  
aminophenoxybiphenylsulfonic acid naphthalene carboxylic acid  
copolymer proton conductor

IT Heat-resistant materials  
((in)org.; proton-conducting polyimide porous film composites for  
**fuel cells**)

IT Films  
(elec. conductive; proton-conducting polyimide porous film  
composites for **fuel cells**)

IT Electric conductors  
Porous materials  
(films; proton-conducting polyimide porous film composites for  
**fuel cells**)

IT Polyimides, uses  
(polyether-, porous; proton-conducting polyimide porous film  
composites for **fuel cells**)

IT Polyimides, uses  
(polyether-, sulfo-contg., in-pore proton conductors;  
proton-conducting polyimide porous film composites for  
**fuel cells**)

IT Polysulfones, uses  
(polyether-, sulfonated, block, in-pore proton conductors;  
proton-conducting polyimide porous film composites for  
**fuel cells**)

IT Polyethers, uses  
(polyimide-, porous; proton-conducting polyimide porous film  
composites for **fuel cells**)

IT Polyethers, uses  
(polyimide-, sulfo-contg., in-pore proton conductors;  
proton-conducting polyimide porous film composites for  
**fuel cells**)

IT Polyethers, uses  
(polysulfone-, sulfonated, block, in-pore proton conductors;  
proton-conducting polyimide porous film composites for  
**fuel cells**)

IT Films  
(porous; proton-conducting polyimide porous film composites for  
**fuel cells**)

IT Polyimides, uses  
(porous; proton-conducting polyimide porous film composites for  
**fuel cells**)

IT Composites  
**Fuel cells**  
(proton-conducting polyimide porous film composites for  
**fuel cells**)

IT Ionic conductors  
(proton; proton-conducting polyimide porous film composites for

**fuel cells)**

- IT Polyethers, uses  
(sulfonated, in-pore proton conductors; proton-conducting  
polyimide porous film composites for **fuel cells**  
)
- IT 13080-85-8, 4,4'-Bis(4-aminophenoxy)biphenyl  
(in prepn. of sulfonated polyimides; proton-conducting polyimide  
porous film composites for **fuel cells**)
- IT 475096-53-8DP, sulfonated **627904-72-7P**  
**627904-73-8P**  
(in-pore proton conductors; proton-conducting polyimide porous  
film composites for **fuel cells**)
- IT 26298-81-7P, 3,3',4,4'-Biphenyltetracarboxylic dianhydride-4,4'-  
diaminodiphenyl ether copolymer 26615-45-2P  
(porous; proton-conducting polyimide porous film composites for  
**fuel cells**)

L43 ANSWER 3 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 138:224172 HCA Full-text

TI Hydrolysis-resistant polyimide electrolyte membrane for **fuel  
cell**

IN Okamoto, Kenichi; Kita, Hidetoshi; Fang, Jian-Hua; Hirano, Tetsuji

PA Yamaguchi T.L.O. Y. K., Japan; Ube Industries, Ltd.

SO Jpn. Kokai Tokkyo Koho, 11 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	JP 2003068326	A	20030307	JP 2001-254725	200108 24

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JP 3910026 B2 20070425

PRAI JP 2001-254725 20010824 <--

AB Title polyimide electrolyte membrane is characterized in that the  
polyimide is prepd. from diamines including sulfonated arom. diamine  
H<sub>2</sub>NA1D1A1NH<sub>2</sub> or H<sub>2</sub>NA2D2A3D2A2NH<sub>2</sub> [D1, D2 = O, CH<sub>2</sub>, C(CH<sub>3</sub>)<sub>2</sub>, C(CF<sub>3</sub>)<sub>2</sub>,  
S; A1 = (C1-2 alkyl-substituted) monosulfonated benzene ring; A2 =  
(C1-2 alkyl-substituted) benzene ring; A3 = sulfonated arom. group  
with certain specific structure].

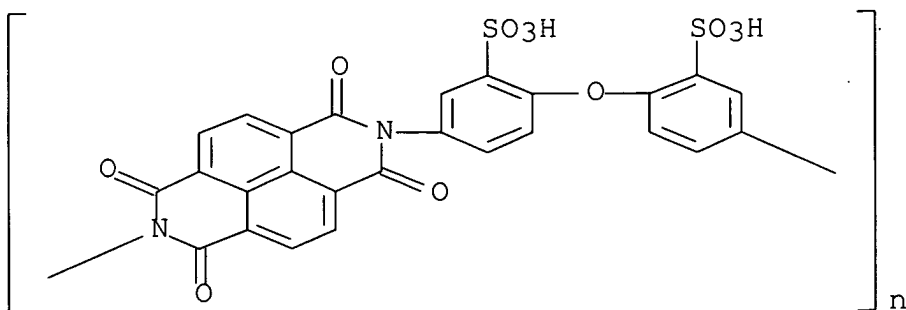
IT **444075-08-5P 500295-68-1P 500295-69-2P**  
**500295-74-9P 500295-76-1P 500295-77-2P**  
**500907-46-0P**

(hydrolysis-resistant polyimide electrolyte membrane for

**fuel cell)**

RN 444075-08-5 HCA

CN Poly[(1,3,6,8-tetrahydro-1,3,6,8-tetraoxobenzo[lmn][3,8]phenanthroline-2,7-diyl)(3-sulfo-1,4-phenylene)oxy(2-sulfo-1,4-phenylene)] (9CI)  
(CA INDEX NAME)



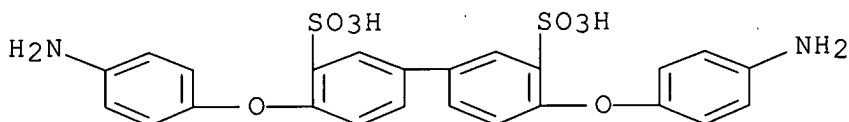
RN 500295-68-1 HCA

CN [1,1'-Biphenyl]-3,3'-disulfonic acid, 4,4'-bis(4-aminophenoxy)-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone  
(CA INDEX NAME)

CM 1

CRN 500295-67-0

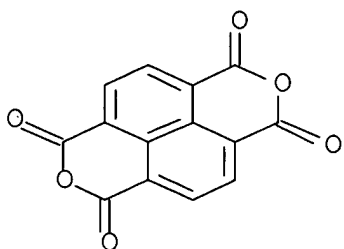
CMF C24 H20 N2 O8 S2



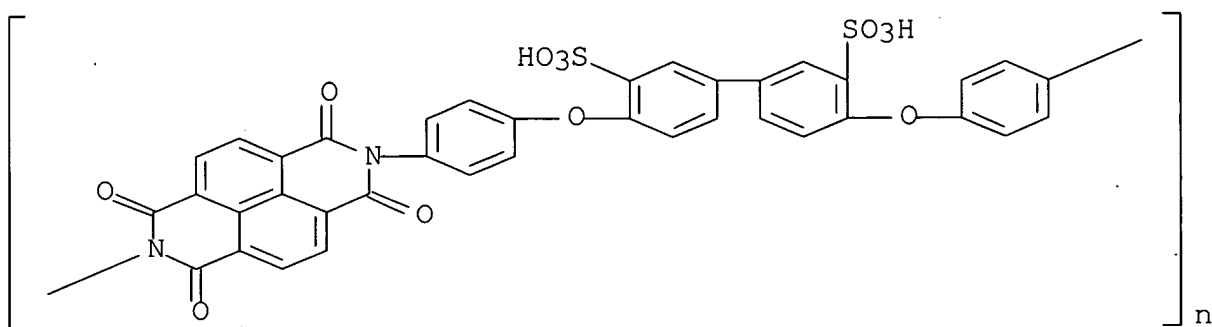
CM 2

CRN 81-30-1

CMF C14 H4 O6



RN 500295-69-2 HCA  
 CN Poly[(1,3,6,8-tetrahydro-1,3,6,8-tetraoxobenzo[lmn][3,8]phenanthroline-2,7-diyl)-1,4-phenyleneoxy(3,3'-disulfo[1,1'-biphenyl]-4,4'-diyl)oxy-1,4-phenylene] (CA INDEX NAME)

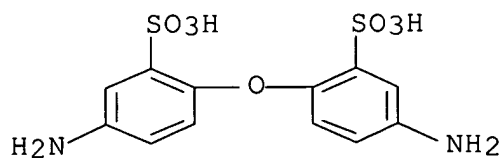


RN 500295-74-9 HCA  
 CN 1,4,5,8-Naphthalenetetracarboxylic acid, polymer with 2,2'-oxybis[5-aminobenzenesulfonic acid] (9CI) (CA INDEX NAME)

CM 1

CRN 6375-06-0

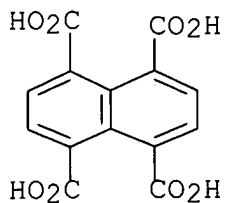
CMF C12 H12 N2 O7 S2



CM 2

CRN 128-97-2

CMF C14 H8 O8



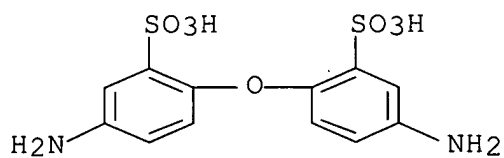
RN 500295-76-1 HCA

CN 1,4,5,8-Naphthalenetetracarboxylic acid, polymer with  
2,2'-oxybis[5-aminobenzenesulfonic acid] and 4,4'-  
oxybis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 6375-06-0

CMF C12 H12 N2 O7 S2

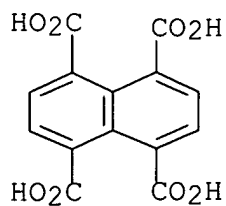


CM 2

CRN 128-97-2

CMF C14 H8 O8

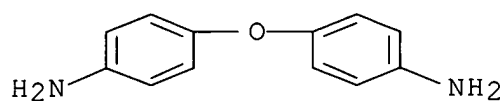




CM 3

CRN 101-80-4

CMF C12 H12 N2 O



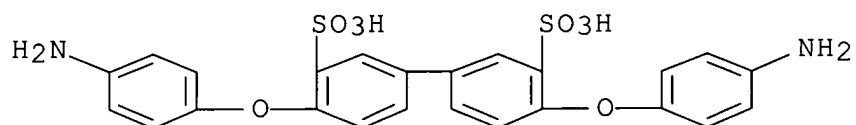
RN 500295-77-2 HCA

CN 1,4,5,8-Naphthalenetetracarboxylic acid, polymer with  
4,4'-bis(4-aminophenoxy)[1,1'-biphenyl]-3,3'-disulfonic acid and  
4,4'-(9H-fluoren-9-ylidene)bis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 500295-67-0

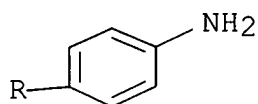
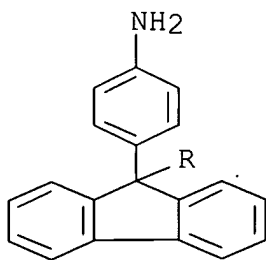
CMF C24 H20 N2 O8 S2



CM 2

CRN 15499-84-0

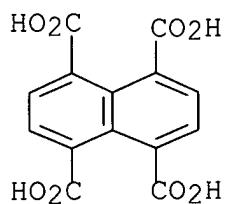
CMF C25 H20 N2



CM 3

CRN 128-97-2

CMF C14 H8 O8



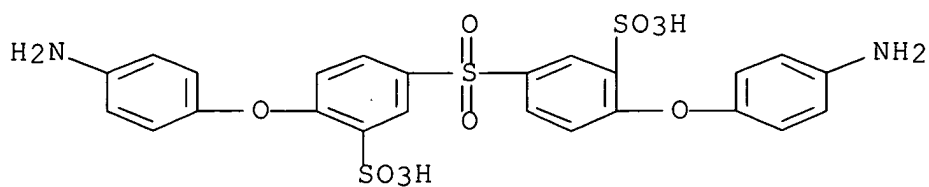
RN 500907-46-0 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-(4-aminophenoxy)-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 3,3'-dimethyl[1,1'-biphenyl]-4,4'-diamine (9CI) (CA INDEX NAME)

CM 1

CRN 500295-70-5

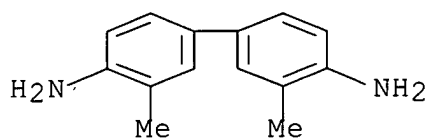
CMF C24 H20 N2 O10 S3



CM 2

CRN 119-93-7

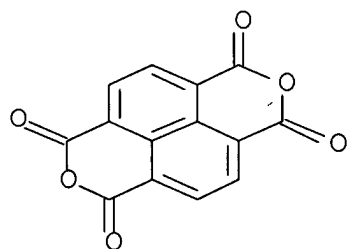
CMF C14 H16 N2



CM 3

CRN 81-30-1

CMF C14 H4 O6



(cardo; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT **Fuel cells**  
 (hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyimides, uses  
 (polyether-, cardo; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyimides, uses  
 (polyether-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polysulfones, uses  
 (polyether-polyimide-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Cardo polymers  
 (polyether-polyimides; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyimides, uses  
 (polyether-polysulfone-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyethers, uses  
 (polyimide-, cardo; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyethers, uses  
 (polyimide-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyethers, uses  
 (polyimide-polysulfone-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Cardo polymers  
 (polyimides; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Electrolytes  
 (polymer membrane; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT **444075-08-5P** 455944-27-1P **500295-68-1P**  
**500295-69-2P** 500295-73-8P **500295-74-9P**  
 500295-75-0P **500295-76-1P** **500295-77-2P**  
**500907-46-0P**  
 (hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT 455944-24-8P, 9,9-Bis(4-aminophenyl)fluorene-2,7-disulfonic acid  
 500295-67-0P, 4,4'-Bis(4-aminophenoxy)biphenyl-3,3'-disulfonic acid  
 500295-70-5P  
 (prepn. of polyimide for electrolyte membrane of **fuel cell**)

IT 6375-06-0P

(prepn. of polyimide for electrolyte membrane of **fuel cell**)

IT 80-09-1, 4,4'-Dihydroxydiphenyl sulfone 101-80-4,  
4,4'-Oxydianiline 350-46-9, 4-Fluoronitrobenzene 13080-85-8,  
4,4'-Bis(4-aminophenoxy)biphenyl 15499-84-0, 9,9-Bis(4-aminophenyl)fluorene

(prepn. of polyimide for electrolyte membrane of **fuel cell**)

L43 ANSWER 4 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 138:58840 HCA Full-text

TI Novel Sulfonated Polyimides as Polyelectrolytes for **Fuel Cell** Application. 1. Synthesis, Proton Conductivity, and Water Stability of Polyimides from 4,4'-Diaminodiphenyl Ether-2,2'-disulfonic Acid

AU Fang, Jianhua; Guo, Xiaoxia; Harada, Satoshi; Watari, Tatsuya; Tanaka, Kazuhiro; Kita, Hidetoshi; Okamoto, Kenchi

CS Department of Advanced Materials Science Engineering Faculty of Engineering, Yamaguchi University, Yamaguchi, 755-8611, Japan

SO Macromolecules (2002), 35(24), 9022-9028

CODEN: MAMOBX; ISSN: 0024-9297

PB American Chemical Society

DT Journal

LA English

AB A sulfonated diamine monomer, 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid (ODADS), was successfully synthesized by direct sulfonation of a com. available diamine, 4,4'-diaminodiphenyl ether (ODA), using fuming sulfuric acid as the sulfonating reagent. A series of sulfonated polyimides were prepd. from 1,4,5,8-naphthalenetetracarboxylic dianhydride (NTDA), ODADS, and common nonsulfonated diamines. The resulting sulfonated polyimides displayed much better stability toward water than those derived from the widely used sulfonated diamine 2,2'-benzidinedisulfonic acid (BDSA). This is because ODADS-based polyimide membranes have a more flexible structure than the corresponding BDSA-based ones. Fenton's reagent test revealed that ODADS-based polyimide membranes also had fair good stability to oxidn. Polyimide membranes with good water stability as well as high proton cond. were developed. NTDA-ODADS/BAPB (1:1) copolyimide membrane (BAPB refers to 4,4'-bis(4-aminophenoxy)biphenyl), for example, did not lose mech. properties after being soaked in water at 80° for 200 h, while its proton cond. was still at a high level (comparable to that of Nafion 117).

IT 444075-07-4P 444075-08-5P 455944-36-2P

479201-86-0P 479201-87-1P 479201-88-2P

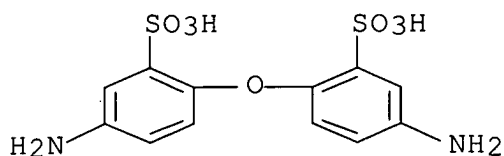
(synthesis, proton cond., and water stability of sulfonated polyimides from 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid as electrolytes for **fuel cells**)

RN 444075-07-4 HCA  
 CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with  
 [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone (9CI) (CA  
 INDEX NAME)

CM 1

CRN 6375-06-0

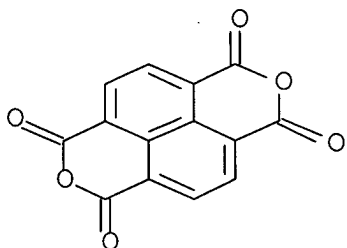
CMF C12 H12 N2 O7 S2



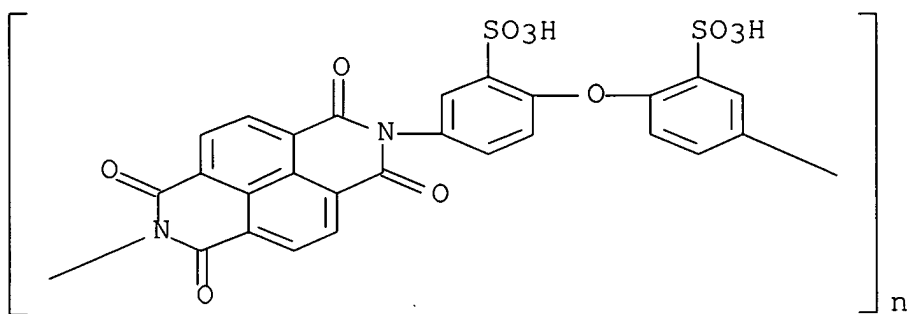
CM 2

CRN 81-30-1

CMF C14 H4 O6



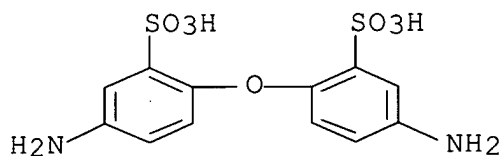
RN 444075-08-5 HCA  
 CN Poly[(1,3,6,8-tetrahydro-1,3,6,8-tetraoxobenzo[1,2,3-cd]phenanthroli  
 ne-2,7-diyl)(3-sulfo-1,4-phenylene)oxy(2-sulfo-1,4-phenylene)] (9CI)  
 (CA INDEX NAME)



RN 455944-36-2 HCA  
 CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with  
 [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
 4,4'-oxybis[benzenamine] (9CI) (CA INDEX NAME)

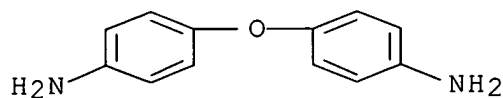
CM 1

CRN 6375-06-0  
 CMF C12 H12 N2 O7 S2



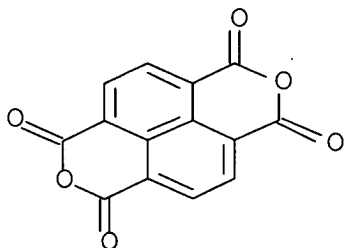
CM 2

CRN 101-80-4  
 CMF C12 H12 N2 O



CM 3

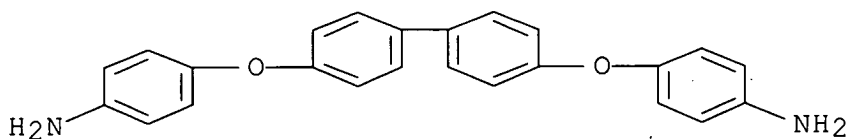
CRN 81-30-1  
CMF C14 H4 O6



RN 479201-86-0 HCA  
CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with  
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
4,4'-[[1,1'-biphenyl]-4,4'-diylbis(oxy)]bis[benzenamine] (CA INDEX  
NAME)

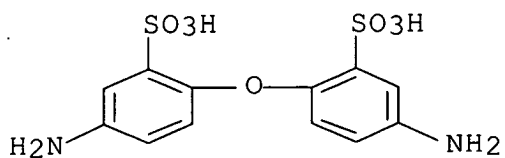
CM 1

CRN 13080-85-8  
CMF C24 H20 N2 O2



CM 2

CRN 6375-06-0  
CMF C12 H12 N2 O7 S2

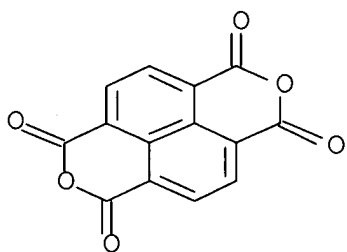




CM 3

CRN 81-30-1

CMF C14 H4 O6



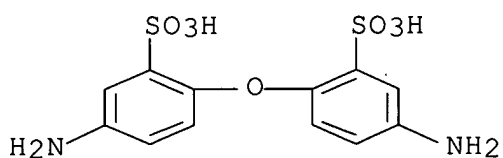
RN 479201-87-1 HCA

CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with  
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[benzenamine]  
(9CI) (CA INDEX NAME)

CM 1

CRN 6375-06-0

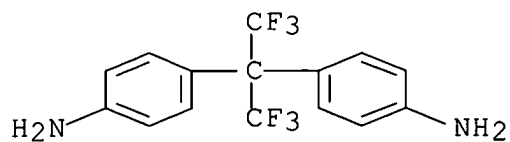
CMF C12 H12 N2 O7 S2



CM 2

CRN 1095-78-9

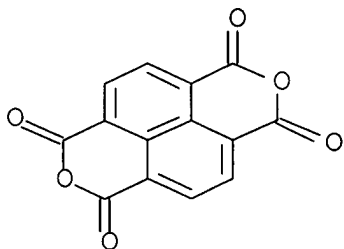
CMF C15 H12 F6 N2



CM 3

CRN 81-30-1

CMF C14 H4 O6



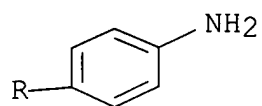
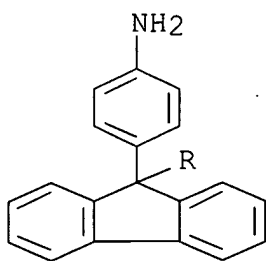
RN 479201-88-2 HCA

CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with  
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
4,4'-(9H-fluoren-9-ylidene)bis[benzenamine] (CA INDEX NAME)

CM 1

CRN 15499-84-0

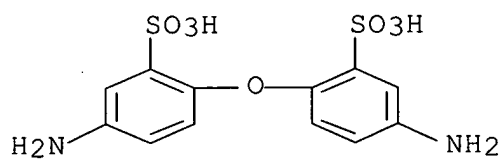
CMF C25 H20 N2



CM 2

CRN 6375-06-0

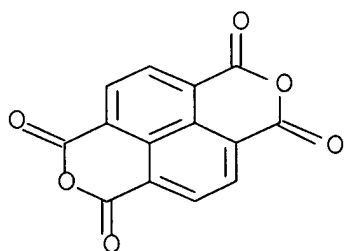
CMF C12 H12 N2 O7 S2.



CM 3

CRN 81-30-1

CMF C14 H4 O6



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 35, 38

ST aminodiphenyl ether disulfonic acid polyimide electrolyte  
**fuel cell**

IT Polyimides, uses  
(sulfonated; synthesis, proton cond., and water stability of  
sulfonated polyimides from 4,4'-diaminodiphenyl  
ether-2,2'-disulfonic acid as electrolytes for **fuel  
cells**)

IT **Fuel cell** electrolytes  
(synthesis, proton cond., and water stability of sulfonated  
polyimides from 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid  
as electrolytes for **fuel cells**)

IT **444075-07-4P 444075-08-5P 455944-36-2P**  
**479201-86-0P 479201-87-1P 479201-88-2P**  
(synthesis, proton cond., and water stability of sulfonated  
polyimides from 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid  
as electrolytes for **fuel cells**)

IT 6375-06-0P  
(synthesis, proton cond., and water stability of sulfonated  
polyimides from 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid  
as electrolytes for **fuel cells**)

RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L43 ANSWER 5 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 137:281852 HCA Full-text

TI Ion-conducting polymer, membrane of the conducting polymer, and  
**fuel cell**

IN Morizono, Kenichi; Tsukamoto, Koji

PA Mitsui Chemicals Inc., Japan

SO Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

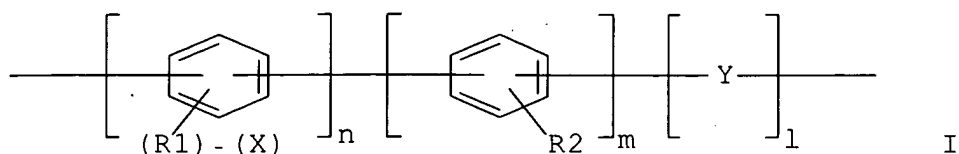
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	JP 2002289222	A	20021004	JP 2001-88889	200103 26

<--

PRAI JP 2001-88889 20010326 <--

GI



AB The polymer has protonic acid groups attached to a polymer main chain via spacer structures having  $\geq 1$  C atoms. The polymer is preferably I, where R1 and R2 are H or various substituents, Y = single bond, arylene, heteroarylene group, various org. and inorg. groups or a combination thereof; n = integer  $\geq 1$ , m and l = integer  $\geq 0$ , and  $(1+m+n) \geq 4$ . The polymer is useful as electrolyte membrane for **fuel cells**.

IT **466696-81-1P 466696-82-2P 466696-83-3P**

(structure of proton conducting polymers for electrolyte membranes in **fuel cells**)

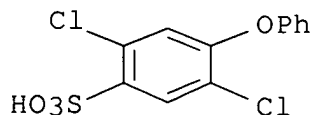
RN 466696-81-1 HCA

CN Benzenesulfonic acid, 2,5-dichloro-4-phenoxy-, polymer with dichlorobenzene (9CI) (CA INDEX NAME)

CM 1

CRN 466696-80-0

CMF C12 H8 Cl2 O4 S



CM 2

CRN 25321-22-6

CMF C6 H4 Cl2

CCI IDS

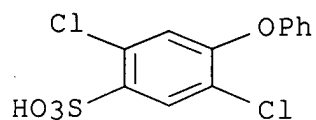


2 ( D1-C1 )

RN 466696-82-2 HCA  
 CN Benzenesulfonic acid, 2,5-dichloro-4-phenoxy-, polymer with  
 (3,4-dichlorophenyl)phenylmethanone (9CI) (CA INDEX NAME)

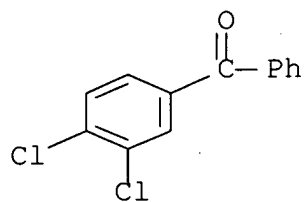
CM 1

CRN 466696-80-0  
 CMF C12 H8 C12 O4 S



CM 2

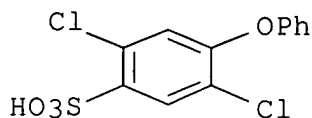
CRN 6284-79-3  
 CMF C13 H8 C12 O



RN 466696-83-3 HCA  
 CN Benzenesulfonic acid, 2,5-dichloro-4-phenoxy-, polymer with  
 bis(4-chlorophenyl)methanone (9CI) (CA INDEX NAME)

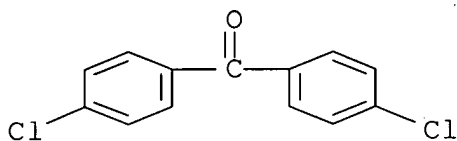
CM 1

CRN 466696-80-0  
CMF C12 H8 C12 O4 S



CM 2

CRN 90-98-2  
CMF C13 H8 C12 O



- IC ICM H01M008-02  
ICS C08G061-10; H01M008-10
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38
- ST **fuel cell** electrolyte ion conducting polymer  
membrane
- IT **Fuel cell** electrolytes  
(structure of proton conducting polymers for electrolyte  
membranes in **fuel cells**)
- IT **466696-81-1P 466696-82-2P 466696-83-3P**  
(structure of proton conducting polymers for electrolyte  
membranes in **fuel cells**)
- L43 ANSWER 6 OF 8 HCA COPYRIGHT 2007 ACS on STN
- AN 137:217917 HCA Full-text
- TI Novel Sulfonated Polyimides as Polyelectrolytes for **Fuel  
Cell** Application. 2. Synthesis and Proton Conductivity of  
Polyimides from 9,9-Bis(4-aminophenyl)fluorene-2,7-disulfonic Acid
- AU Guo, Xiaoxia; Fang, Jianhua; Watari, Tatsuya; Tanaka, Kazuhiro;  
Kita, Hidetoshi; Okamoto, Kenichi
- CS Faculty of Engineering, Department of Advanced Materials Science &

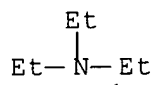
Engineering, Yamaguchi University, Ube, Yamaguchi, 755-8611, Japan  
 SO Macromolecules (2002), 35(17), 6707-6713  
 CODEN: MAMOBX; ISSN: 0024-9297  
 PB American Chemical Society  
 DT Journal  
 LA English  
 AB A new sulfonated diamine monomer, 9,9-bis(4-aminophenyl)fluorene-2,7-disulfonic acid (BAPFDS), was synthesized by direct sulfonation of the parent diamine, 9,9-bis(4-aminophenyl)fluorene (BAPF), using fuming sulfuric acid as the sulfonating reagent. A series of sulfonated polyimides with different sulfonation degrees were prepd. from 1,4,5,8-naphthalenetetracarboxylic dianhydride (NTDA), BAPFDS, and common nonsulfonated diamines. The resulting sulfonated polyimides generally showed good soly. in m-cresol and DMSO. Proton conductivities of these polyimide membranes were measured as the functions of relative humidity and temp. The resulting homopolyimide, NTDA-BAPFDS, displayed proton conductivities quite similar to those of Nafion 117 in the whole humidity range (RH < 100%). At 100% relative humidity, all the BAPFDS-based polyimide membranes showed proton conductivities similar to or higher than those of Nafion 117. In addn., BAPFDS-based polyimide membranes exhibited much better water stability than those derived from a widely used sulfonated diamine, 2,2'-benzidinedisulfonic acid (BDSA), with similar IEC (ion exchange capacity). This is probably because of the higher basicity of BAPFDS, which is favorable for maintaining the stability of imido rings.

IT **455944-37-3P**  
 (synthesis and proton cond. of polyimides from  
 9,9-bis(4-aminophenyl)fluorene-2,7-disulfonic acid)

RN 455944-37-3 HCA  
 CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with  
 [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
 4,4'-oxybis[benzenamine], compd. with N,N-diethylethanamine (9CI)  
 (CA INDEX NAME)

CM 1

CRN 121-44-8  
 CMF C6 H15 N





CM 2

CRN 455944-36-2

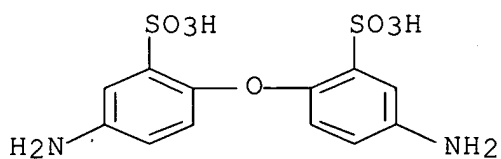
CMF (C14 H4 O6 . C12 H12 N2 O7 S2 . C12 H12 N2 O) x

CCI PMS

CM 3

CRN 6375-06-0

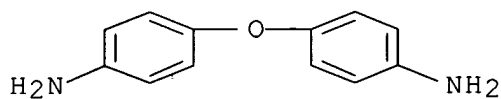
CMF C12 H12 N2 O7 S2



CM 4

CRN 101-80-4

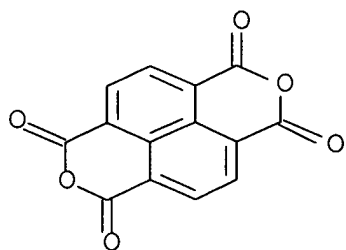
CMF C12 H12 N2 O



CM 5

CRN 81-30-1

CMF C14 H4 O6



CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 35, 37

IT 455944-26-0P 455944-28-2P 455944-30-6P 455944-33-9P  
455944-35-1P **455944-37-3P**

(synthesis and proton cond. of polyimides from  
9,9-bis(4-aminophenyl)fluorene-2,7-disulfonic acid)

RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L43 ANSWER 7 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 137:6509 HCA Full-text

TI Synthesis and characterization of sulfonated polyimides based on  
six-membered ring as proton exchange membranes

AU Hong, Young-Taik; Einsla, Brian; Kim, Yuseung; McGrath, James E.

CS Dep. Chem. Materials Res. Inst., Virginia Polytechnic Inst. State  
Univ., Blacksburg, VA, 24061, USA

SO Polymer Preprints (American Chemical Society, Division of Polymer  
Chemistry) (2002), 43(1), 666-667

CODEN: ACPPAY; ISSN: 0032-3934

PB American Chemical Society, Division of Polymer Chemistry

DT Journal; (computer optical disk)

LA English

AB Arom. six-membered ring polyimides contg. pendant sulfonic acid  
groups appear to be promising materials for proton exchange membrane  
**fuel cell** applications. 3,3'-Disulfonic acid-bis[4-(3-  
aminophenoxy)phenyl] sulfone (SA-DADPS) as a sulfonated diamine  
monomer was prep'd. by nucleophilic substitution of sodium 3,3'-  
disulfonate-4,4'-dichlorodiphenyl sulfone (S-DCDPS) with m-  
aminophenol. A series of copolyimides contg. sulfonic acid  
functional groups were synthesized from six-membered dianhydrides,  
SA-DADPS and m-BAPS via high-temp. direct polycondensation using m-  
cresol as a solvent. The copolyimides were characterized for mol.  
wt., chem. compn., thermal stability, solvent soly. and film forming  
properties via soln. casting from DMAc. The materials are of  
interest as new polymeric electrolyte proton exchange membranes.

IT **433683-42-2P**

(synthesis and characterization of sulfonated  
polyether-polysulfone-polyimides based on  
naphthalenetetracarboxylic dianhydride for proton exchange  
membranes)

RN 433683-42-2 HCA

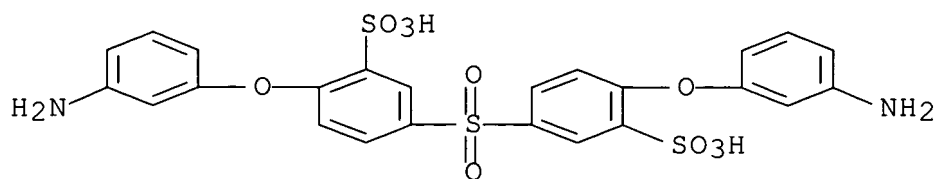
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-(3-aminophenoxy)-, polymer  
with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
3,3'-[sulfonylbis(4,1-phenyleneoxy)]bis[benzenamine] (CA INDEX

NAME)

CM 1

CRN 433683-41-1

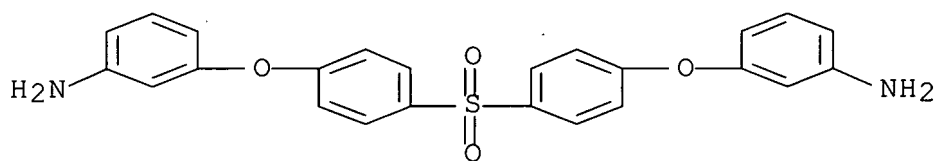
CMF C24 H20 N2 O10 S3



CM 2

CRN 30203-11-3

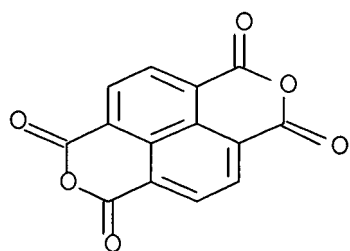
CMF C24 H20 N2 O4 S



CM 3

CRN 81-30-1

CMF C14 H4 O6



CC 35-5 (Chemistry of Synthetic High Polymers)

IT 433683-42-2P

(synthesis and characterization of sulfonated polyether-polysulfone-polyimides based on naphthalenetetracarboxylic dianhydride for proton exchange membranes)

RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L43 ANSWER 8 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 127:280784 HCA Full-text

TI Aromatic polymer electrolyte membranes and their manufacture for **fuel cells**

IN Azuma, Ryuji; Nagai, Kenji; Kondo, Masako; Murase, Kazuhisa; Takada, Chikayuki

PA Aisin AW Co., Japan; Echos Research K. K.

SO Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

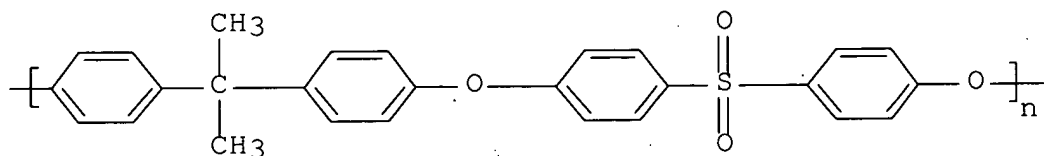
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	JP 09245818	A	19970919	JP 1996-69448	19960229

<--

PRAI JP 1996-69448 19960229 <--

GI



AB The electrolyte membranes are composed of sulfonated polysulfone I, contg. SO<sub>3</sub>H groups attached to the arom. ring in the repeating units to an ion exchange capacity 1.6-3.2 mmol/g, and have compressive strength ≥80 kg/cm<sup>2</sup>. The electrolyte membranes are prepd. by

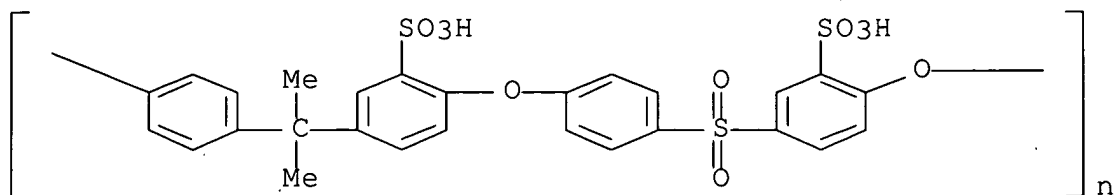
applying a soln. of the sulfonated polysulfone on a substrate and heat treating at 40-80° for ≥12 h. The electrolyte membranes have long lifetime.

IT 196301-55-0

(structure and manuf. of arom. polymer electrolyte membranes and their manuf. for **fuel cells**)

RN 196301-55-0 HCA

CN Poly[oxy(2-sulfo-1,4-phenylene)sulfonyl-1,4-phenyleneoxy(2-sulfo-1,4-phenylene)(1-methylethylidene)-1,4-phenylene] (9CI) (CA INDEX NAME)



IC ICM H01M008-02

ICS B01D071-68; C08G075-23; C08J005-22; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **fuel cell** sulfonated polysulfone electrolyte membrane

IT **Fuel cell** electrolytes

(structure and manuf. of arom. polymer electrolyte membranes and their manuf. for **fuel cells**)

IT Polysulfones, uses

(sulfonated; structure and manuf. of arom. polymer electrolyte membranes and their manuf. for **fuel cells**)

IT 196301-55-0

(structure and manuf. of arom. polymer electrolyte membranes and their manuf. for **fuel cells**)

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(FORMULA 3)

=> D L36 1-4 BIB ABS HITSTR HITIND

L36 ANSWER 1 OF 4 HCA COPYRIGHT 2007 ACS on STN

AN 141:40719 HCA Full-text

TI Method for producing membrane-**electrode** structure for

polymer electrolyte **fuel cell**

IN Tani, Masaki; Shinkai, Hiroshi; Kohyama, Katsuhiko; Tanaka, Ichiro;  
Hama, Yuichiro; Yano, Junichi

PA Honda Motor Co., Ltd., Japan

SO U.S. Pat. Appl. Publ., 23 pp.

CODEN: USXXCO

DT Patent

LA English

FAN.CNT 1

	PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
PI	US 2004115499	A1	20040617	US 2003-721505	200311 26
				<--	
	US 7306876	B2	20071211		
	JP 2004193109	A	20040708	JP 2003-371048	200310 30
				<--	
	JP 2004221056	A	20040805	JP 2003-371049	200310 30
				<--	
	JP 2004214173	A	20040729	JP 2003-371836	200310 31
				<--	
PRAI	JP 2002-347580	A	20021129	<--	
	JP 2002-366037	A	20021218	<--	
	JP 2002-379820	A	20021227	<--	
	JP 2003-371048	A	20031030		
	JP 2003-371049	A	20031030		
	JP 2003-371836	A	20031031		

AB The present invention provides a method for producing a membrane-**electrode** structure having an excellent adhesiveness between an **electrode catalyst** layer and a diffusion **electrode**, and a polymer electrolyte **fuel cell** using a membrane-**electrode** structure obtained by the prodn. method. Moreover, it also provides an elec. app. and a transport machine that use the above polymer electrolyte **fuel cell**. A **catalyst** past comprising a **catalyst** supported by an electron conducting material and an ion conducting material is applied on a sheet substrate, and it is then dried, so as to form **electrode catalyst** layers. The **electrode catalyst** layers are thermally transferred onto each side of a polymer electrolyte membrane, so as to form a laminated body. A first slurry comprising a water-

repellent material and an electron conducting material is applied on a carbon substrate layer, and it is dried to form a water-repellent layer, and then, a second slurry comprising an electron conducting material and an ion conducting material is applied on the water-repellent layer, and it is dried to form a hydrophilic layer, so that a diffusion **electrode** is formed. The previously formed diffusion **electrode** is laminated on the **electrode catalyst** layer through the hydrophilic layer, and they are then pressed under heating, so as to integrate the laminated body and the diffusion **electrode**.

IT **122325-09-1DP**, reaction products with derivatized benzophenones, **sulfonated**  
 (method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

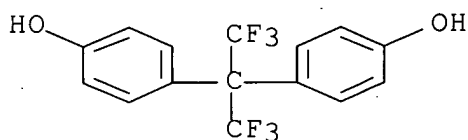
RN 122325-09-1 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (CA INDEX NAME)

CM 1

CRN 1478-61-1

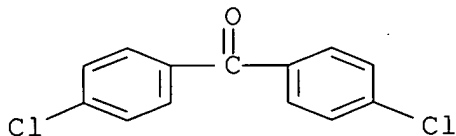
CMF C15 H10 F6 O2



CM 2

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM H01M008-10

ICS H01M004-88; H01M004-96; B05D005-12

INCL 429030000; 427115000; 502101000; 429044000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

ST membrane **electrode** structure fabrication polymer  
electrolyte **fuel cell**

IT **Catalysts**  
(electrocatalysts; method for producing membrane-  
**electrode** structure for polymer electrolyte **fuel**  
**cell**)

IT Polyoxyalkylenes, uses  
(fluorine- and sulfo-contg., ionomers; method for producing  
membrane-**electrode** structure for polymer electrolyte  
**fuel cell**)

IT Electric apparatus  
**Fuel cell electrodes**  
**Fuel cell** electrolytes  
(method for producing membrane-**electrode** structure for  
polymer electrolyte **fuel cell**)

IT Fluoropolymers, uses  
(method for producing membrane-**electrode** structure for  
polymer electrolyte **fuel cell**)

IT Polyketones  
(polyarylene-polyether-, sulfonated; method for producing  
membrane-**electrode** structure for polymer electrolyte  
**fuel cell**)

IT Polysulfones, uses  
(polyarylene-polyether-; method for producing membrane-  
**electrode** structure for polymer electrolyte **fuel**  
**cell**)

IT Polyethers, uses  
(polyarylene-polyketone-, sulfonated; method for producing  
membrane-**electrode** structure for polymer electrolyte  
**fuel cell**)

IT Polyethers, uses  
(polyarylene-polysulfone-; method for producing membrane-  
**electrode** structure for polymer electrolyte **fuel**  
**cell**)

IT Polyphenyls  
(polyketone-, fluorine-contg.; method for producing membrane-  
**electrode** structure for polymer electrolyte **fuel**  
**cell**)

IT Polyphenyls  
(polyketone-, sulfonated; method for producing membrane-  
**electrode** structure for polymer electrolyte **fuel**  
**cell**)

IT Fluoropolymers, uses  
(polyketone-polyphenyl-; method for producing membrane-  
**electrode** structure for polymer electrolyte **fuel**



cell)

IT Fuel cells  
 (polymer electrolyte; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Fluoropolymers, uses  
 (polyoxyalkylene-, sulfo-contg., ionomers; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Ionomers  
 (polyoxyalkylenes, fluorine- and sulfo-contg.; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Polyketones  
 (polyphenyl-, fluorine-contg.; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Polyketones  
 (polyphenyl-, sulfonated; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Carbon fibers, uses  
 (pore formers; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Carbon black, uses  
 (support; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Machinery  
 (transport; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 7440-06-4, Platinum, uses 37258-14-3  
 (method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 122325-09-1DP, reaction products with derivatized benzophenones, **sulfonated** 463954-50-9DP, reaction product with bisphenol AF and derivatized benzophenone oligomer, **sulfonated** 701909-66-2DP, reaction product with bisphenol AF and derivatized benzophenone oligomer, **sulfonated**  
 (method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 9002-84-0, Ptfе  
 (method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 122325-09-1P  
 (method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 7440-44-0, Carbon, uses

(substrate; method for producing membrane-**electrode**  
structure for polymer electrolyte **fuel cell**)

L36 ANSWER 2 OF 4 HCA COPYRIGHT 2007 ACS on STN

AN 141:40691 HCA Full-text

TI Membrane-**electrode** structure for polymer electrolyte  
**fuel cell**

IN Fukuda, Kaoru; Tanaka, Ichiro; Tani, Masaki; Matsuo, Junji

PA Honda Motor Co., Ltd., Japan

SO Eur. Pat. Appl., 26 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	EP 1429403	A2	20040616	EP 2003-26936	200311 25

<--

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,  
SK

JP 2004193106	A	20040708	JP 2003-360615	200310 21
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<--

US 2004115502	A1	20040617	US 2003-720280	200311 25
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<--

PRAI	JP 2002-341362	A	20021125	<--
	JP 2003-360615	A	20031021	

AB A membrane-**electrode** structure capable of exhibiting excellent elec. power generation performance even in a high current region and a polymer electrolyte **fuel cell** using the membrane-**electrode** structure are provided. Addnl., elec. appliances and transport machines each using the above-described polymer electrolyte **fuel cell** are provided. The membrane-**electrode** structure comprises an **anode**, a **cathode** and a polymer electrolyte membrane made of a sulfonated polyarylene based polymer and held between both **electrodes**. The **cathode** comprises an **electrode catalyst** layer contg. a **catalyst** particle having the **catalyst** loaded on the carbon particles, a pore forming member and an ion conducting polymer falling within the wt. ratio range from 1.0 to 1.8 in relation to the carbon particles, and is in contact with the polymer electrolyte membrane through the **electrode catalyst** layer.

The **electrode catalyst** layer has a total sum vol. of the pores falling within the pore diam. range from 0.01 to 30  $\mu\text{m}$ , of the pores formed by the pore forming member, equal to or more than 6.0  $\mu\text{L}/\text{cm}^2\text{-mg catalyst}$ . The pores formed by the pore forming member have a first peak falling within the pore diam. range from 0.01 to 0.1  $\mu\text{m}$  and a second peak falling within the pore diam. range from 0.1 to 1.0  $\mu\text{m}$ .

IT **122325-09-1DP**, reaction products with phenoxy derivatized benzophenone, **sulfonated**  
(membrane-**electrode** structure for polymer electrolyte **fuel cell**)

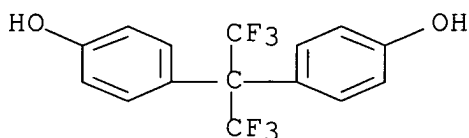
RN 122325-09-1 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (CA INDEX NAME)

CM 1

CRN 1478-61-1

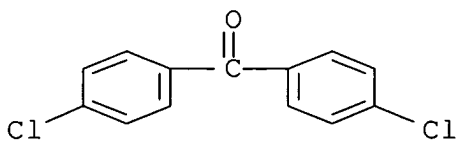
CMF C15 H10 F6 O2



CM 2

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM H01M004-86

ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

ST polymer electrolyte **fuel cell** membrane

**electrode** structure

IT **Catalysts**  
 (electrocatalysts; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Polyoxyalkylenes, uses  
 (fluorine- and sulfo-contg., ionomers; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Electric apparatus  
**Fuel cell electrodes**  
**Fuel cell** electrolytes  
 (membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Carbon black, uses  
 (membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Polyketones  
 (polyarylene-polyether-, sulfonated; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Polysulfones, uses  
 (polyarylene-polyether-; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Polyethers, uses  
 (polyarylene-polyketone-, sulfonated; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Polyethers, uses  
 (polyarylene-polysulfone-; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT **Fuel cells**  
 (polymer electrolyte; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Fluoropolymers, uses  
 (polyoxyalkylene-, sulfo-contg., ionomers; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Ionomers  
 (polyoxyalkylenes, fluorine- and sulfo-contg.; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Machinery  
 (transport; membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 12613-88-6  
 (membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 7440-44-0, Carbon, uses  
 (membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 582300-03-6, Nafion SE20192  
 (membrane-**electrode** structure for polymer electrolyte  
**fuel cell**)

IT 122325-09-1DP, reaction products with phenoxy derivatized  
 benzophenone, **sulfonated** 463954-50-9DP, reaction  
 products bisphenol AF benzophenone oligomer, sulfonated  
 (membrane-**electrode** structure for polymer electrolyte  
**fuel cell**)

IT 122325-09-1P  
 (membrane-**electrode** structure for polymer electrolyte  
**fuel cell**)

L36 ANSWER 3 OF 4 HCA COPYRIGHT 2007 ACS on STN

AN 140:409652 HCA Full-text

TI Method of fabrication of **electrode** structure for polymer  
 electrolyte **fuel cell**

IN Hama, Yuichiro; Iguchi, Masaru; Yano, Junichi; Kanaoka, Nagayuki;  
 Mitsuta, Naoki

PA Honda Motor Co., Ltd, Japan

SO U.S. Pat. Appl. Publ., 17 pp.

CODEN: USXXCO

DT Patent

LA English

FAN.CNT 1

	PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
PI	US 2004096731	A1	20040520	US 2003-713146	200311 17
				<--	
	JP 2004186142	A	20040702	JP 2003-371834	200310 31
				<--	
	JP 2004186143	A	20040702	JP 2003-371835	200310 31
				<--	
	US 2007166594	A1	20070719	US 2007-723436	200703 20
				<--	
PRAI	JP 2002-333566	A	20021118	<--	
	JP 2002-334302	A	20021118	<--	
	JP 2003-371834	A	20031031		
	JP 2003-371835	A	20031031		

AB There is provided an **electrode** structure for a polymer electrolyte **fuel cell** having excellent power generation performance and excellent durability and a method for manufg. the same. Also provided is a polymer electrolyte **fuel cell** including the **electrode** structure and an elec. app. and a transport app. using the polymer electrolyte **fuel cell**. The **electrode** structure includes a polymer electrolyte membrane sandwiched between a pair of **electrode catalyst** layers contg. carbon particles supporting **catalyst** particles. The polymer electrolyte membrane is made of a sulfonated polyarylene-based polymer. The sulfonated polyarylene-based polymer has an ion exchange capacity in the range of 1.7 to 2.3 meq/g, and the polymer contains a component insol. in N-methylpyrrolidone in an amt. of 70% or less relative to the total amt. of the polymer, after the polymer is subjected to heat treatment for exposing it under a const. temp. atm. of 120° for 200 h. A **catalyst** paste contg. **catalyst** particles and a polymer electrolyte is coated on a sheet-like support and dried to form an **electrode catalyst** layer contg. a solvent in an amt. in the range of 0.5% or less by wt. of the total membrane. The **electrode catalyst** layers are thermally transferred and joined on both sides of the polymer electrolyte membrane.

IT 690268-39-4DP, sulfonated

(method of fabrication of **electrode** structure for polymer electrolyte **fuel cell**)

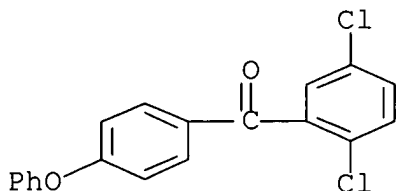
RN 690268-39-4 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)(4-phenoxyphenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

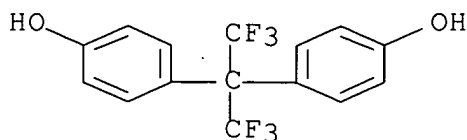
CRN 151173-25-0

CMF C19 H12 Cl2 O2



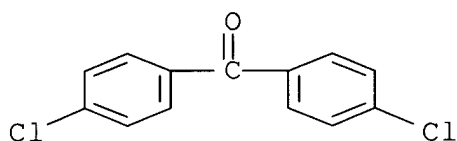
CM 2

CRN 1478-61-1  
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2  
CMF C13 H8 Cl2 O



IC ICM H01M004-96  
ICS H01M008-10; H01M004-88; B05D005-12  
INCL 429044000; 429033000; 427115000; 502101000  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
ST **electrode** structure polymer electrolyte **fuel cell**  
IT **Catalysts**  
(electrocatalysts; method of fabrication of **electrode** structure for polymer electrolyte **fuel cell**)  
IT **Fuel cell electrodes**  
(method of fabrication of **electrode** structure for polymer electrolyte **fuel cell**)  
IT Carbon black, uses  
(method of fabrication of **electrode** structure for polymer electrolyte **fuel cell**)  
IT Fluoropolymers, uses  
(method of fabrication of **electrode** structure for polymer electrolyte **fuel cell**)  
IT Polyesters, uses  
(method of fabrication of **electrode** structure for

polymer electrolyte **fuel cell**)

IT **Fuel cells**  
 (solid electrolyte; method of fabrication of **electrode**  
 structure for polymer electrolyte **fuel cell**)

IT 7440-06-4, Platinum, uses  
 (method of fabrication of **electrode** structure for  
 polymer electrolyte **fuel cell**)

IT **690268-39-4DP, sulfonated** 690268-39-4P  
 (method of fabrication of **electrode** structure for  
 polymer electrolyte **fuel cell**)

IT 9002-84-0, Ptfе  
 (method of fabrication of **electrode** structure for  
 polymer electrolyte **fuel cell**)

IT 122325-09-1P  
 (method of fabrication of **electrode** structure for  
 polymer electrolyte **fuel cell**)

IT 25038-59-9, Polyethylene terephthalate, uses  
 (method of fabrication of **electrode** structure for  
 polymer electrolyte **fuel cell**)

IT 7440-44-0, Carbon, uses  
 (support; method of fabrication of **electrode** structure  
 for polymer electrolyte **fuel cell**)

L36 ANSWER 4 OF 4 HCA COPYRIGHT 2007 ACS on STN

AN 140:409627 HCA Full-text

TI **Electrode** structure for polymer electrolyte **fuel**  
**cells**

IN Sohma, Hiroshi; Iguchi, Masaru; Kanaoka, Nagayuyki; Kaji, Hayato;  
 Morikawa, Hiroshi; Mitsuta, Naoki

PA Honda Motor Co., Ltd., Japan

SO Eur. Pat. Appl., 26 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	EP 1420473	A1	20040519	EP 2003-26194	200311 17

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EP 1420473 B1 20060412

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
 PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,  
 SK

US 2004197632 A1 20041007 US 2003-714394



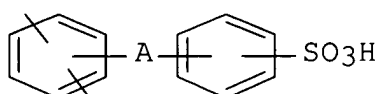
200311  
17

JP 2005158265                      A                      20050616                      JP 2003-387362

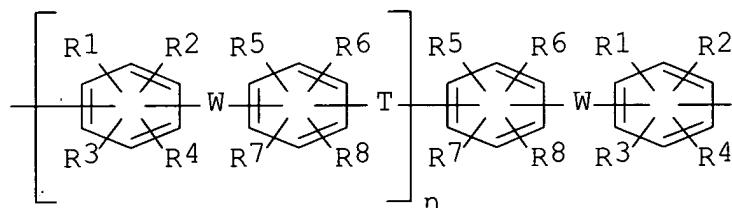
200311  
18

PRAI JP 2002-333143                      A                      20021118                      <--  
JP 2003-371047                      A                      20031030

GI



I



II

AB The present invention provides an **electrode** structure for polymer electrolyte **fuel cells**, inexpensive, and exhibiting excellent power prodn. capacity and durability even under high temp./low humidity conditions, and also provides a polymer electrolyte **fuel cell** which incorporates the same **electrode** structure. The present invention also provides an elec. device and transportation device, each incorporating the same polymer electrolyte **fuel cell**. The **electrode** structure comprises a pair of **electrode catalyst** layers, each contg. a **catalyst** supported by carbon particles, and polymer electrolyte membrane placed between these **electrode catalyst** layers. The polymer electrolyte membrane is of a sulfonated polyarylene composed of 0.5 to 100% by mol of the first repeating unit represented by (I) and 0 to 99.5% by mol of the second repeating unit represented by (II): (wherein, A is a divalent org. group; and a benzene ring includes its deriv.; -W- is a divalent electron attracting group; - T- is a divalent org. group; and R1 to R8 are a hydrogen atom or fluorine

atom, an alkyl group, fluorine-substituted alkyl group, allyl group, aryl group or cyano group, and may be the same or different).

IT 690247-89-3D, ester hydrolysis products  
(**electrode** structure for polymer electrolyte  
**fuel cells**)

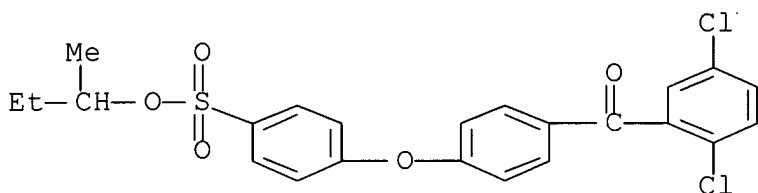
RN 690247-89-3 HCA

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-,  
1-methylpropyl ester, polymer with bis(4-chlorophenyl)methanone and  
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol],  
block (9CI) (CA INDEX NAME)

CM 1

CRN 690247-88-2

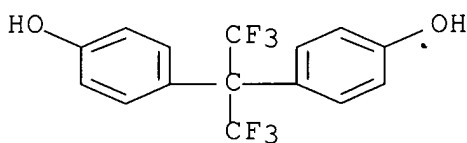
CMF C23 H20 Cl2 O5 S



CM 2

CRN 1478-61-1

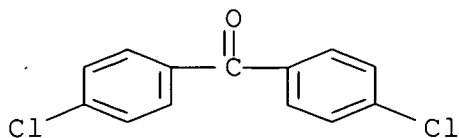
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



(**electrode** structure for polymer electrolyte  
**fuel cells**)

- IC ICM H01M008-10
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38
- ST **electrode** structure polymer electrolyte **fuel**  
**cell**
- IT **Catalysts**  
(electrocatalysts; **electrode** structure for polymer  
electrolyte **fuel cells**)
- IT **Fuel cell electrodes**  
(**electrode** structure for polymer electrolyte  
**fuel cells**)
- IT Noble metals  
(**electrode** structure for polymer electrolyte  
**fuel cells**)
- IT Fluoropolymers, uses  
(**electrode** structure for polymer electrolyte  
**fuel cells**)
- IT Polyoxyalkylenes, uses  
(fluorine- and sulfo-contg., ionomers; **electrode**  
structure for polymer electrolyte **fuel cells**)
- IT Fluoropolymers, uses  
(polyoxyalkylene-, sulfo-contg., ionomers; **electrode**  
structure for polymer electrolyte **fuel cells**)
- IT Ionomers  
(polyoxyalkylenes, fluorine- and sulfo-contg.; **electrode**  
structure for polymer electrolyte **fuel cells**)
- IT **Fuel cells**  
(solid electrolyte; **electrode** structure for polymer  
electrolyte **fuel cells**)
- IT 7440-06-4, Platinum, uses  
(**electrode** structure for polymer electrolyte  
**fuel cells**)
- IT 690247-89-3D, ester hydrolysis products  
(**electrode** structure for polymer electrolyte  
**fuel cells**)
- IT 9002-84-0, Ptfе  
(**electrode** structure for polymer electrolyte

**fuel cells)**

IT 122325-09-1P 663920-23-8P, Benzenesulfonic acid,  
 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, sodium salt 663920-24-9P,  
 4-[4-(2,5-Dichlorobenzoyl)phenoxy]benzenesulfonyl chloride  
 690247-88-2P **690247-89-3P**  
 (electrode structure for polymer electrolyte  
**fuel cells)**

IT 7440-44-0, Carbon, uses  
 (support; **electrode** structure for polymer electrolyte  
**fuel cells)**

=> D L38 1-6 BIB ABS HITSTR HITIND

L38 ANSWER 1 OF 6 HCA COPYRIGHT 2007 ACS on STN  
 AN 141:54792 HCA Full-text  
 TI Aromatic sulfonate derivative, polyarylene, sulfonated polyarylene  
 and production method thereof, macromolecular solid electrolyte, and  
 proton conductive membrane  
 IN Kanaoka, Nagayuki; Iguchi, Masaru; Mitsuta, Naoki; Soma, Hiroshi;  
 Ohtsuki, Toshihiro  
 PA JSR Corporation, Japan; Honda Motor Co., Ltd.  
 SO Eur. Pat. Appl., 19 pp.  
 CODEN: EPXXDW  
 DT Patent  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	EP 1431281	A1	20040623	EP 2003-28999	200312 17

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EP 1431281 B1 20060510  
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
 PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,  
 SK

JP 2004196947	A	20040715	JP 2002-367042	200212 18
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JP 3939244	B2	20070704		
US 2004126639	A1	20040701	US 2003-734194	

200312  
15

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US 7078121 B2 20060718  
PRAI JP 2002-367042 A 20021218 <--  
OS MARPAT 141:54792

AB Described herein is a prodn. method of sulfonated polyarylene that is safe and enables easy control of the amt. and position of sulfonic groups introduced in the polymer. The sulfonated polyarylene is also disclosed. The invention further provides a polyarylene and an arom. sulfonate deriv. that are suitably employed in the above prodn. method. Also provided are a macromol. solid electrolyte that comprises the sulfonated polyarylene, and a proton conductive membrane. The arom. sulfonate deriv. has the formula  $X_2C_6H_3YC_6H_4ASO_2R$ , wherein X is a halogen atom other than fluorine, a  $-OSO_3CH_3$  group or a  $-OSO_3CF_3$  group; Y is a divalent org. group; A is  $-(CH_2)_m-$  or  $-(CF_2)_m-$  (wherein m is an integer of 1 to 10); and R is a C4-20 hydrocarbon group. The prodn. method of sulfonated polyarylene comprises coupling polymn. of an arom. compd. that includes at least the arom. sulfonate deriv. and hydrolysis of the resultant polyarylene.

IT 705967-34-6P

(arom. sulfonate deriv., polyarylene, sulfonated polyarylene and prodn. method thereof, macromol. solid electrolyte, and proton conductive membrane)

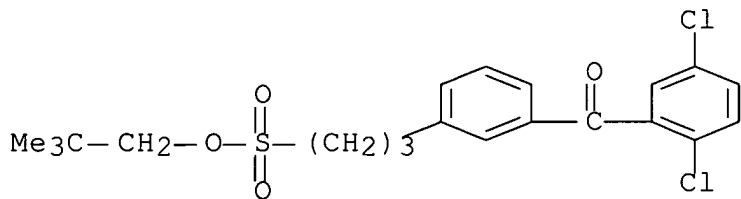
RN 705967-34-6 HCA

CN Benzenepropanesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethyldiene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 705967-33-5

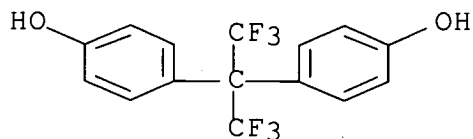
CMF C21 H24 Cl2 O4 S



CM 2

CRN 1478-61-1

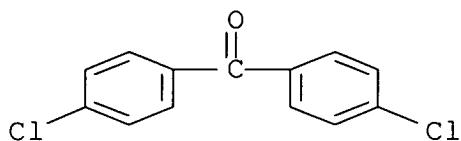
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IT 705967-34-6DP, hydrolyzed  
(arom. **sulfonate** deriv., polyarylene,  
**sulfonated** polyarylene and prodn. method thereof,  
macromol. solid electrolyte, and proton conductive membrane)

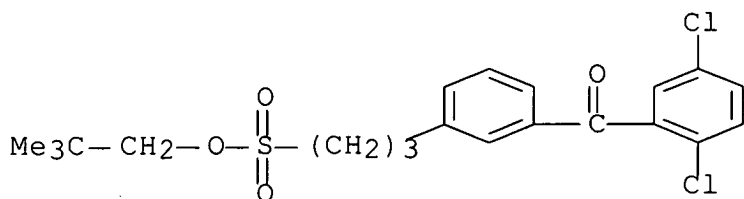
RN 705967-34-6 HCA

CN Benzenepropanesulfonic acid, 3-(2,5-dichlorobenzoyl)-,  
2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone  
and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]  
(9CI) (CA INDEX NAME)

CM 1

CRN 705967-33-5

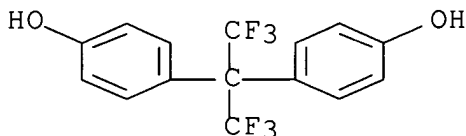
CMF C21 H24 Cl2 O4 S



CM 2

CRN 1478-61-1

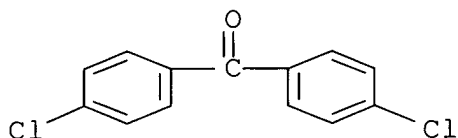
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM C07C309-67

ICS C08G061-10; C08G061-12; H01M010-40

CC 35-2 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 52

ST arom sulfonate polymer proton conductive membrane **fuel cell**

IT **Fuel cells**

Hydrolysis

Polymer electrolytes

(arom. sulfonate deriv., polyarylene, sulfonated polyarylene and prodn. method thereof, macromol. solid electrolyte, and proton conductive membrane)

IT **705967-34-6P**

(arom. sulfonate deriv., polyarylene, sulfonated polyarylene and prodn. method thereof, macromol. solid electrolyte, and proton conductive membrane)

IT **705967-34-6DP**, hydrolyzed

(arom. **sulfonate** deriv., polyarylene,

**sulfonated** polyarylene and prodn. method thereof,  
macromol. solid electrolyte, and proton conductive membrane)

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L38 ANSWER 2 OF 6 HCA COPYRIGHT 2007 ACS on STN

AN 139:367516 HCA Full-text

TI Varnish composition for **fuel cell** electrodes.

IN Higami, Makoto; Goto, Kohei; Kanaoka, Osayuki; Takahashi, Ryoichiro;  
Asano, Yoichi; Kakutani, Osamu; Okiyama, Hajime

PA JSR Ltd., Japan; Honda Motor Co., Ltd.

SO Jpn. Kokai Tokkyo Koho, 17 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	JP 2003317749	A	20031107	JP 2002-122822	200204 24
				<--	
	JP 3994024	B2	20071017		
	DE 10318398	A1	20031204	DE 2003-10318398	200304 23
				<--	
	US 2004028806	A1	20040212	US 2003-420968	200304 23
				<--	
	US 2006269655	A1	20061130	US 2006-498173	200608 03

PRAI JP 2002-122822 A 20020424 <--  
JP 2002-122823 A 20020424 <--  
JP 2002-122824 A 20020424 <--  
US 2003-420968 A3 20030423

AB The disclosed varnish compn. comprises sulfonated polymer, water, an  
org. solvent which is as good solvent for the polymer, and another  
solvent whose b. p. is  $\geq 50^\circ$  but lower than that of the good solvent.  
The varnish compn. gives uniform proton-conductive membranes on the  
**fuel cell** electrodes.

IT **463963-71-5D, sulfonated**  
(mixed solvents for **sulfonated** polymer varnish for



**fuel cell** proton-conductive membranes)

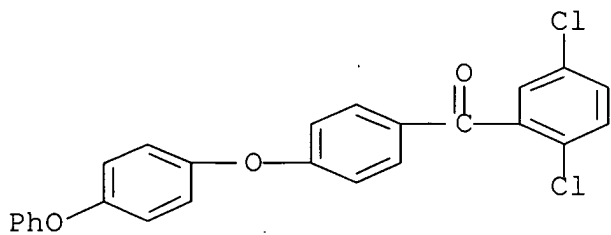
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

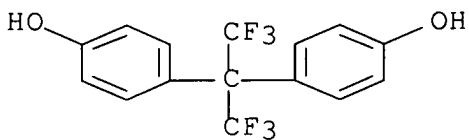
CMF C25 H16 C12 O3



CM 2

CRN 1478-61-1

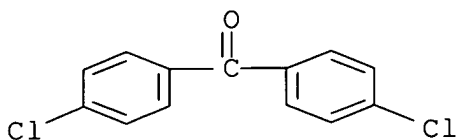
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 C12 O



IC ICM H01M008-02  
ICS H01M008-10  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 42  
ST solvent mixt sulfonated polymer varnish **fuel cell**  
electrode  
IT Varnishes  
(for formation of sulfonated polymer type proton conductive  
membranes for **fuel cells**)  
IT Solvents  
(for varnishes for forming proton-conductive membranes on  
**fuel cell** electrode)  
IT **Fuel cell** electrodes  
(solvent mixt. for varnishes for forming proton-conductive  
membranes on)  
IT 78-93-3, Methyl ethyl ketone, uses 109-99-9, Tetrahydrofuran, uses  
110-71-4 872-50-4, N-Methyl-2-pyrrolidone, uses 7732-18-5,  
Water, uses  
(mixed solvents for sulfonated polymer varnish for **fuel**  
**cell** proton-conductive membranes)  
IT **463963-71-5D, sulfonated**  
(mixed solvents for **sulfonated** polymer varnish for  
**fuel cell** proton-conductive membranes)

L38 ANSWER 3 OF 6 HCA COPYRIGHT 2007 ACS on STN

AN 139:340077 HCA Full-text

TI Manufacture of multilayer structures suitable for **fuel**  
**cells**

IN Higami, Makoto; Goto, Kohei; Kanaoka, Osayuki; Takahashi, Ryoichiro;  
Asano, Yoichi; Kakutani, Osamu; Okiyama, Hajime

PA JSR Ltd., Japan; Honda Motor Co., Ltd.

SO Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 3

	PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
PI	JP 2003317739	A	20031107	JP 2002-122823	200204 24
				<--	
	JP 3822130	B2	20060913		
	DE 10318398	A1	20031204	DE 2003-10318398	

200304  
23

US 2004028806 A1 20040212 US 2003-420968 <--

200304  
23

US 2006269655 A1 20061130 US 2006-498173 <--

200608  
03

PRAI JP 2002-122822 A 20020424 <--  
JP 2002-122823 A 20020424 <--  
JP 2002-122824 A 20020424 <--  
US 2003-420968 A3 20030423 <--

AB Aq. dispersions contg. 0.5-20 wt.% perfluorosulfonic acid polymers are applied on an electrode layer, and sulfonated polyarylene solns. are applied on the resulting perfluorosulfonic acid polymer layer to give the multilayer structures. The perfluorosulfonic acid polymer layer prevents penetration of the sulfonated polyarylene layer into the electrode layer to provide membrane-electrode assemblies for **fuel cells** with high power generation performance.

IT **463963-71-5D**, Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer, **sulfonated**

(manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

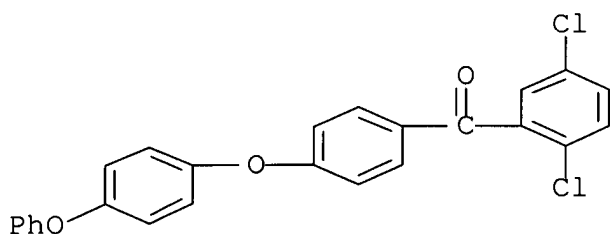
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

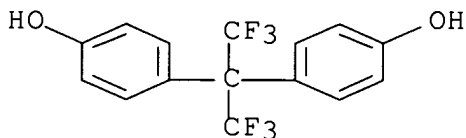
CMF C25 H16 Cl2 O3



CM 2

CRN 1478-61-1

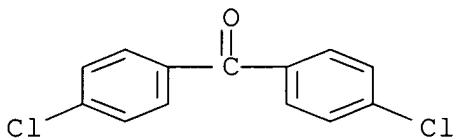
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM H01M008-02

ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

ST perfluorosulfonate polymer sulfonated polyarylene **fuel**

**cell**; membrane electrode **fuel cell**

sulfonated polyarylene

IT Conducting polymers

(ionic; manuf. of multilayer membrane-electrode assemblies for  
**fuel cells**)

IT Coating process

**Fuel cell** electrodes

**Fuel cell** electrolytes

Polymer electrolytes

(manuf. of multilayer membrane-electrode assemblies for  
**fuel cells**)

IT Sulfonic acids, uses

(perfluorosulfonic acid polymers; manuf. of multilayer

membrane-electrode assemblies for **fuel cells**)

IT Polyketones  
(polyether-, arom., fluorine-contg., sulfonated; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

IT Fluoropolymers, uses  
(polyether-polyketone-, arom., sulfonated; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

IT Polyethers, uses  
(polyketone-, arom., fluorine-contg., sulfonated; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

IT Ionic conductors  
(polymeric; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

IT **Fuel cells**  
(solid electrolyte; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

IT Coating process  
(spray; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

IT Fluoropolymers, uses  
(sulfo-contg., perfluoro; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

IT Fluoropolymers, uses  
(sulfo-contg.; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

IT 66796-30-3, Nafion 117 **463963-71-5D**, Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer, **sulfonated**  
(manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

L38 ANSWER 4 OF 6 HCA COPYRIGHT 2007 ACS on STN

AN 139:119897 HCA Full-text

TI Polymer electrolyte composition and proton-conductive membrane for **fuel cell**

IN Okaniwa, Motoki; Goto, Kohei

PA JSR Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 21 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI JP 2003201403 A 20030718 JP 2002-2793

200201  
09

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PRAI JP 2002-2793 20020109 <--

AB The compn. contains a polymer electrolyte and an antioxidant contg.  
(a)  $\geq 1$  compd. selected from a phenolic OH-contg. compd. and an amine  
and (b) an org. P or org. S compd. except the phenols or amines. The  
proton-conductive membrane is that made of the compn. showing  
enhancement of resistance to oxidn. by H<sub>2</sub>O<sub>2</sub> radical (generated in  
**fuel cells**) without affecting proton cond. and mech. strength.

IT **463963-71-5DP, sulfonated**  
(polymer electrolyte compn. contg. antioxidant for  
proton-conductive membrane in **fuel cell**)

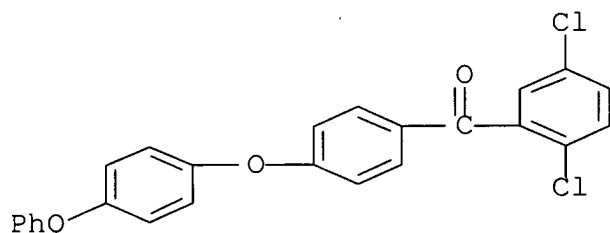
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

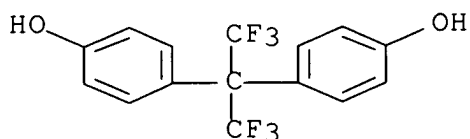
CMF C25 H16 Cl2 O3



CM 2

CRN 1478-61-1

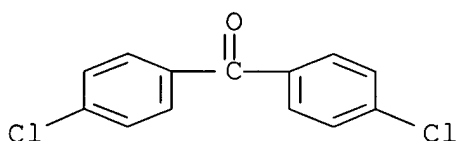
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 C12 O



- IC ICM C08L101-00  
ICS C08G065-12; C08K005-13; C08K005-17; C08K005-36; C08K005-49;  
C08L071-00; C25B013-08; H01M008-02; H01M008-10
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38
- ST polymer electrolyte compn proton conductive membrane; antioxidant  
phenol amine org phosphorus compd; sulfur compd antioxidant polymer  
electrolyte; radical resistance polymer electrolyte **fuel**  
**cell**
- IT Polyketones  
(polyether-, fluorine-contg.; polymer electrolyte compn. contg.  
antioxidant for proton-conductive membrane in **fuel**  
**cell**)
- IT Fluoropolymers, uses  
(polyether-polyketone-; polymer electrolyte compn. contg.  
antioxidant for proton-conductive membrane in **fuel**  
**cell**)
- IT Polyethers, uses  
(polyketone-, fluorine-contg.; polymer electrolyte compn. contg.  
antioxidant for proton-conductive membrane in **fuel**  
**cell**)
- IT Antioxidants  
**Fuel cells**  
Polymer electrolytes  
(polymer electrolyte compn. contg. antioxidant for  
proton-conductive membrane in **fuel cell**)
- IT Ionic conductors  
(protonic; polymer electrolyte compn. contg. antioxidant for  
proton-conductive membrane in **fuel cell**)
- IT 364062-39-5DP, 4,4'-Dichlorobenzophenone-2,5-Dichloro-4'-  
phenoxybenzophenone copolymer, sulfonated **463963-71-5DP**,

**sulfonated**

(polymer electrolyte compn. contg. antioxidant for  
proton-conductive membrane in **fuel cell**)

IT 693-36-7, Distearyl-3,3'-thiodipropionate 1455-42-1D,  
3,9-Bis(2-hydroxy-1,1-dimethylethyl)-2,4,8,10-  
tetraoxaspiro[5.5]undecane, ester mixt. 1703-58-8D,  
1,2,3,4-Butanetetra-carboxylic acid, ester mixt. 1709-70-2,  
1,3,5-Trimethyl-2,4,6-tris[3,5-di(tert-butyl)-4-  
hydroxybenzyl]benzene 2403-89-6D, 1,2,2,6,6-Pentamethyl-4-  
piperidinol, ester mixt. 6683-19-8, Pentaerythrityl  
tetraakis[3-[3,5-di(tert-butyl)-4-hydroxyphenyl]propionate].  
27676-62-6, Tris[3,5-di(tert-butyl)-4-hydroxybenzyl] isocyanurate  
29598-76-3 80693-00-1, Bis[2,6-di(tert-butyl)-4-  
methylphenyl]pentaerythritol diphosphite 561307-00-4  
(polymer electrolyte compn. contg. antioxidant for  
proton-conductive membrane in **fuel cell**)

L38 ANSWER 5 OF 6 HCA COPYRIGHT 2007 ACS on STN

AN 139:77168 HCA Full-text

TI Sulfonated polyarylene composition and proton-conductive membrane

IN Okaniwa, Motoki; Goto, Kohei

PA JSR Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 13 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	JP 2003183526	A	20030703	JP 2001-391748	200112 25

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PRAI JP 2001-391748 20011225 <--

AB The compn. contains a sulfonated polyarylene, a hindered phenol with  
mol. wt.  $\geq 500$ , and a hindered amine with mol. wt.  $\geq 500$ . The proton-  
conductive membrane, useful as a solid electrolyte in a **fuel cell**,  
etc., is made of the compn. showing resistance to oxidn. and mech.  
strength.

IT **463963-71-5DP**, Bisphenol AF-4,4'-dichlorobenzophenone-2,5-  
dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer,  
**sulfonated**

(**sulfonated** polyarylene compn. contg. hindered phenol  
and hindered amine antioxidants for proton-conductive membrane)

RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-

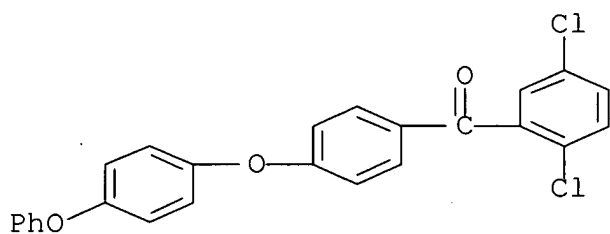


(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

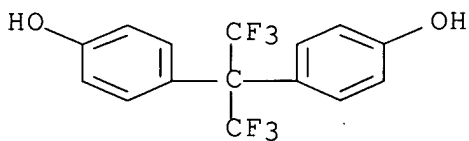
CMF C25 H16 Cl2 O3



CM 2

CRN 1478-61-1

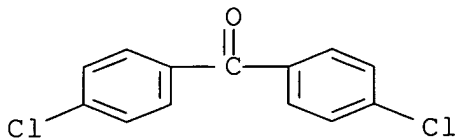
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM C08L101-06

ICS C08K005-13; C08K005-3435; H01B001-06; H01M008-02  
 CC 76-2 (Electric Phenomena)  
 Section cross-reference(s): 38  
 IT 7664-93-9DP, Sulfuric acid, polyarylene sulfonate with  
 364062-39-5DP, 4,4'-Dichlorobenzophenone-2,5-dichloro-4'-  
 phenoxybenzophenone copolymer, sulfonated **463963-71-5DP**,  
 Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-  
 phenoxy)phenoxybenzophenone copolymer, **sulfonated**  
 (**sulfonated** polyarylene compn. contg. hindered phenol  
 and hindered amine antioxidants for proton-conductive membrane)

L38 ANSWER 6 OF 6 HCA COPYRIGHT 2007 ACS on STN  
 AN 138:239119 HCA Full-text  
 TI Crosslinked polymer electrolytes with high proton conductivity and  
 durability and their manufacture  
 IN Okaniwa, Motoki; Goto, Kohei  
 PA JSR Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 19 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	JP 2003082012	A	20030319	JP 2001-275421	200109 11

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PRAI JP 2001-275421 20010911 <--  
 AB The polymer electrolytes for **fuel cell** proton-conductive membranes,  
 battery electrolytes, displays, sensors, capacitors, ion-exchange  
 membranes, etc., are manufd. by polyimg. monomers having  $\geq 2$  radical-  
 polymerizable groups in the presence of proton-conductive polymers  
 and have insoly. to N-methylpyrrolidone  $\geq 40\%$ . Thus, bisphenol AF-  
 4,4'-dichlorobenzophenone oligomer was reacted with 2,5-dichloro-4'-  
 (4-phenoxy)phenoxybenzophenone to give a copolymer, which was reacted  
 with H<sub>2</sub>SO<sub>4</sub>. A mixt. contg. the sulfonated polymer and Kayarad DPHA  
 (dipentaerythritol hexaacrylate-dipentaerythritol pentaacrylate  
 mixt.) was processed to give a crosslinked polymer film showing high  
 proton cond. and tensile strength.  
 IT **463963-71-5DP**, Bisphenol AF-4,4'-dichlorobenzophenone-2,5-  
 dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer,  
**sulfonated**  
 (dipentaerythritol hexaacrylate- and dipentaerythritol  
 pentaacrylate-crosslinked; crosslinked polymer electrolytes with  
 high proton cond. and durability and their manuf.)

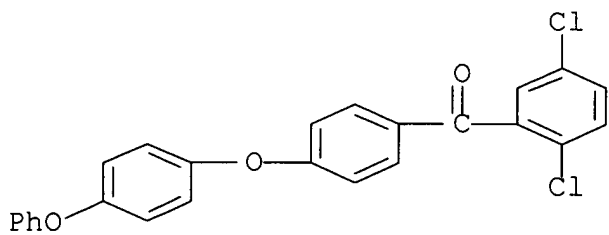
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

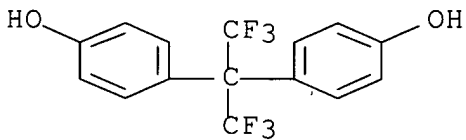
CMF C25 H16 C12 03



CM 2

CRN 1478-61-1

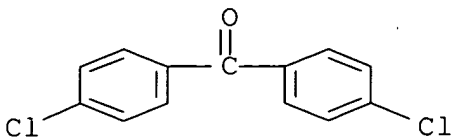
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 C12 O



IC ICM C08F002-44  
ICS C08F283-00; H01B001-06; H01B013-00; H01M008-02; H01M008-10  
CC 38-3 (Plastics Fabrication and Uses)  
Section cross-reference(s): 52, 76  
IT 364062-39-5DP, 4,4'-Dichlorobenzophenone-2,5-dichloro-4'-  
phenoxybenzophenone copolymer, sulfonated **463963-71-5DP**,  
Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-  
phenoxy)phenoxybenzophenone copolymer, **sulfonated**  
(dipentaerythritol hexaacrylate- and dipentaerythritol  
pentaacrylate-crosslinked; crosslinked polymer electrolytes with  
high proton cond. and durability and their manuf.)

=>